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COMPUDISK Software offer: Page 96

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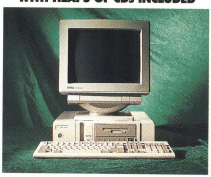
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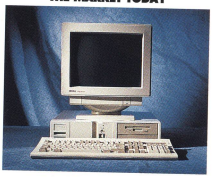
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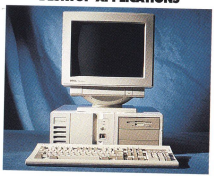
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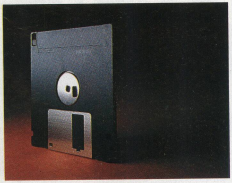
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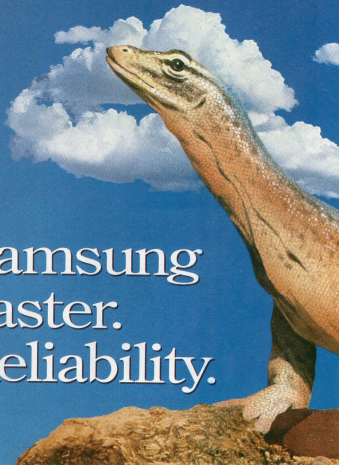
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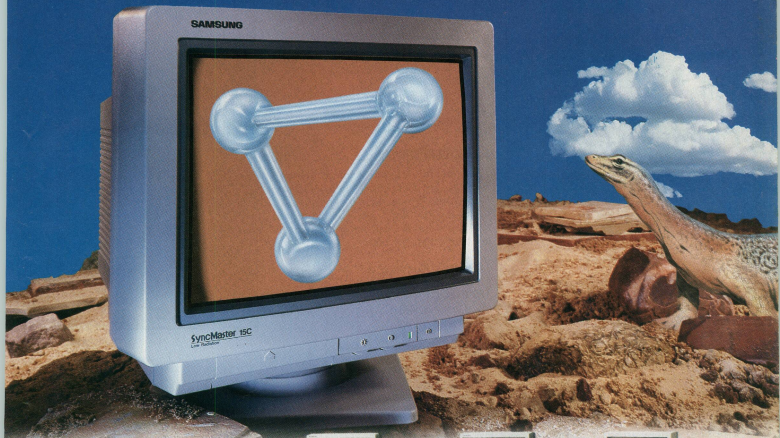
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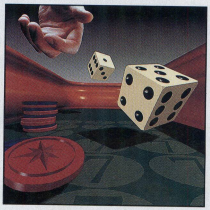
Technically impressive, Apple's Newton MessagePad and the Tandy/Casio Zoomer are the first true Personal Digital Assistants. Their potential is tantalising, but the reality leaves something to be desired. Prices are high, handwriting recognition marginal, and communications are incomplete. Yet with the technology advances, PDAs may yet fulfill their original vision.

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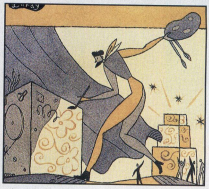
Deciding on a NOS can seem like you're laying down chips on a game of chance. So make sure the ante and the odds are right for you before you make your choice.



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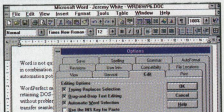
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Clones under pressure

There is disagreement amongt clone PC manufacturers on the effects of fluctuations in RAM prices, and the exchange rate, while name-brand vendors claim that the local clone market is showing serious signs of hurting as a result of industry restructuring.

Following publication of last month's comparative review of 486DX/33 PCs for under $3000, *APC* received a number of complaints from readers who had contacted *Editor's Choice* recipient, All Data, regarding the Arrow PC, and had been quoted between $3290 and $3800, in some cases for PCs with lesser configurations.

Managing director of All-Data, Mr Abraham Moussa, expressed regret that customers had been upset by price increases, which he argued were the result of exchange rate fluctuations and RAM price increases.

"My apology for any inconvenience," Moussa said, "and any loss that customers have incurred on that particular review machine we'll refund. I'm telling dealers that from today they should sell at that [published] price until the end of October."

"This is a mess," he said, "and I intend to fix this mess."

Mr Matthew Walterhausen of Sydney was one caller to All Data, seeking a quote for 55 PCs. "The woman at the other end ummed and ahhed," he said, "and eventually claimed the article was incorrect, the prices were misquoted, and *APC* had got it wrong. After negotiating for over a day and a half, I got a quote — that she said they were making no margin on — for $3800. That was their dealer buy price!"

Other readers whose enquiries were redirected to retailer Pacific MicroLab were quoted $3290 for a machine without a caching drive controller or Actix graphics card, the two features that distinguished the Arrow in benchmark results. (*APC* tested a machine with a 1M Actix GE/32 controller, but All Data provided specifications and prices for a 2M version.)

According to All Data's sales and marketing coordinator, Ms Therese Santon, "when we submitted the machine, our costs allowed us to sell for $2990. Our prices now don't allow us to sell for $2990. We increased the price by the bare minimum we could to keep it as close as possible. RAM prices have gone up, plus the fluctuations in the Australian dollar."

According to KCM Direct's Mr Mario Papas, however, "the Australian dollar has been hovering around 65 to 67 cents for months, hard drive prices have dropped, RAM prices have dropped from three months ago, and now the price for controller cards is coming down. Production costs have definitely dropped." Mr Papas said that he has been able to increase the specifications on the Compro to include a 255M drive without increasing the price.

Ms Santon says, however, that All Data has been upfront. "We don't try to rip anybody off," she said. "We didn't gauge properly that customers would question the price increase."

Queried on why retailer Pacific MicroLab — which, according to Moussa, has two common directors with All Data — had told *APC* reviewer Ben Gerholt that its prices were at least two months old, Santon said that she could not comment, as it was a separate company and free to set its own prices and configurations. She said that all dealers had been told that the RRP for the tested system — assembled especially for the review — had increased from $2990 to $3290 immediately the October issue of *APC* hit the newsstands.

According to Mr Mark Phibbs, IBM Australia's marketing manager for personal systems, raising prices would be unacceptable from an IBM perspective. "If we give you a price, we stick by that price," Mr Phibbs said. "We honour a published price for at least 30 or 60 days, and often on big contracts for many months."

Mr Phibbs argues that clone vendors are under pressure. "With low margins, there's a complete restructur-

News roundup

■ Every year from the beginning of October to the middle of November the rate of computer product introductions slows down as US companies start looking to the Comdex/Fall computer show in Las Vegas. They either like to have something to announce at Comdex if they have invested in a stand there or they want to spend time at Comdex looking at the competition before putting the finishing touches to their product.

While other shows around the world like CeBit and the Japanese Consumer Electronic show are bigger, Comdex/Fall is the biggest pure computer show of all. In what is, for me, one of the worst cities in the world — Las Vegas — the whole of the US computer industry and many of the key players from the rest of the world gather to inspect each other's products and discuss directions.

Much of the most interesting stuff goes on behind the closed doors of the large hotel suites, where vendors display half-finished technologies to people they hope will either buy or help them promote the new products based on those technologies.

Australian software companies do occasionally have a presence at Comdex, but they are not part of the charmed inner circle that gets to see the very latest gear. However, Australian software is carving out its own markets as more and more companies export their products.

■ This growing sophistication among our developer community

News roundup (cont.)

was on show at two conferences in Sydney during the last month. The first was Object World, which of course focussed on object-oriented languages and programming techniques. Both organisers and attendees went around with big smiles, so I guess it must have been a big success.

The second conference focussed on programmers was the Australian Software Developers (ASD) conference also in Sydney just a couple of weeks after Object World. The seminar on the difficulties in exporting shrinkwrapped applications got a lot of coverage.

Also on the conference front, the Australian Unix Users Group held their annual exhibition and conference in Sydney between Object World and ASD. This, too, was reported a great success with more than 600 people registering for the conference.

All this only goes to show what conference groupies we all are.

■ While a very few companies like Compaq have had Pentium-based machines on the market for some time, the flow of Pentium-based machines from other vendors is still slow. We heard during the last month that some manufacturers have delayed the release of their new machines until next year because of problems with the Intel-designed PCI local bus chips.

Among those who have actually brought out Pentium machines is Acer. Last month the Taiwan-based company launched a whole range of new machines including new laptops and a new version of its multimedia machine. At the top of the range was a dual Pentium machine aimed at the server market.

■ Also aiming for the server market, AST unleashed its Manhattan multiprocessor machine last month. The company announced that it will start assembling machines here in Australia.

■ Another important manufacturing decision came from Lexmark. The IBM spin-off, which is now the second-largest supplier of laser printers in Australia, plans

ing of the industry, and second-tier clone companies are starting to lose market share. Volume is everything. If you start to lose volume you can't cover your costs," he said. "On average, name vendors will have higher standards because their brand is so important to them. You can't afford to have poor ethics. After people, name brand is your biggest asset."

Dell's Mr Denis Rowe told *APC*, "I think the local industry is now hurting seriously — especially with the price of SIMMs. The bottom line is these guys are working from day to day. Our prices never go up! We don't need to do that."

The increase in price was of some significance considering that IBM, Compaq and Dell all missed the cut-off for the review by less than the amount by which All Data had increased its prices upon publication. Dell has also now announced a 486DX/33 4/170 that would have met the review criteria, for just $2895.

Jeremy White

Analogue to digital: and all that jazz

New communications player, Vodafone, chose to favour the offbeat this month, when the launch of the company's unique digital mobile telephone system was opened by the beautiful braying trumpet of world-famous Australian jazz maestro, James Morrison. The beaming Mr Morrison, demonstrating the different capabilities of analogue and digital in a musical context, played the first few phrases of Bach's toccata and fugue on his trumpet ("that's analogue"), then switched to an Akai 1000 digital trumpet routed through a sampler and Yamaha C1 PC to deliver the next passage in an earth-shaking pipe organ sample (". . . and that's digital").

Vodafone, a world leader in digital mobile communications, holds 56 per cent of the mobile phone market in the



James Morrison: the difference between analogue and digital

UK, although the company has only been in existence for six years. Speaking in front of a huge 9-monitor telescreen, Vodafone chairman, Mr Gerry Whent, attributed the company's success to a "better product and better service." He allowed Australian managing director, Mr John Rohan, to fill in the details: the 018 analogue system was"obsolete" and "overloaded" and is scheduled to cease operation at the end of the decade anyway. Vodafone's digital mobile system, on the other hand, offers superior sound quality, greater security, longer battery life and access to the Global System for Mobiles (GSM) network. GSM mobile phones are fully compatible with ISDN, providing worldwide coverage.

Mr Rohan then turned to the imposing wall of screens behind him to greet the Federal Minister for Communications, the Hon David Beddal, who appeared, live and larger than life, from Parliament House in Canberra. Although several hundred kilometres away, the Minister was nonetheless coming through clearly in all formats, and was pleased to declare the Vodafone service open.

There then followed a round of questions from both cities, with the Canberra journalists directing their queries to Mr Rohan via a similar telescreen that had been set up in the ACT. The whole affair, potentially a nightmare of crossed signals, went off without a hitch, a good omen for Vodafone, which is sinking half a billion dollars into developing the system in Australia, anticipating that it will create 500 jobs in the process.

Proceedings closed with Mr Morrison's sublime version of 'background music'.

Nathaniel Tunbridge

News at your fingertips

In 1994, Microsoft and Dow Jones & Co. will bring excerpts of the daily news to handheld computers. By dialling a toll-free number, US users will receive a summary of *The Wall Street Journal*, plus sports scores and stock quotes.

Despite the fact that this product is the "first electronic publication designed for mobile business professionals," in the words of a Dow Jones press release, it will be a while before attention is paid to the professional who is mobile in Australia. "The chances are that this will first be made for a North American market," says Karen Andring, a Microsoft spokesperson.

Will international versions of The Personal Journal be available down the road? "Ab-



What kind of relationship do you have with your computer? If you think about it you'll discover it's largely based on trust. After all, the vital information that you depend on is trusted to a part of your computer called the disc drive.



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News roundup (cont.)

to build machines here both for Australian consumption and for export.

■ Meanwhile in the non-Intel high end, a number of companies are pushing 'PCs' based on chips like *DEC's Alpha*, Motorola/IBM PowerPC and MIPS R4000. These machines are really more in the workstation class, but the advent of Windows NT allows the manufacturers to try and grab a marketing advantage by calling their machines PCs.

IBM launched its PowerPC-based machines and DEC added to its Alpha range. Acer got into the act with a machine based on the R4000.

■ The Unix shuffle was on again this month. Novell is looking for someone to take on the ownership of the Unix name that it picked up along with its purchase of the AT&T off-shoot Unix Systems Laboratories (USL). Sun and SCO have been very vocal in their criticism of how Novell is handling Unix. While COSE and the agreement on common APIs have been positive steps, unless these guys can really get together and make Unix more standardised, nobody is going to care who owns Unix in a few years.

■ Meanwhile, Apple is still trying to position itself for a future that may well not include the Macintosh. The local subsidiary has reorganised to divide itself into new divisions that follows those now in place at head office.

■ The other fruit in the PC business, Apricot, has finally shut up shop here in Australia. The company has had a chequered career here and even though it has in recent years bought out excellent machines that have been ahead of the rest, it hasn't been able to make a dent in the Australian market. While there have been a number of reasons for this, I would suggest that the major problem was that the company did not spend enough on promoting itself to win the attention of the corporate clients who really need its technology.

Jeremy Horey

solutely," Genny Van Dorn at Dow Jones responds. "I'm sure these things will change very quickly." Once the product establishes itself in the US, Dow Jones and Microsoft will decide what they want to do with the product internationally.

It is "up to manufacturers to make sure they can access The Personal Journal around the world," according to Maggie Landis at Dow Jones. Though handheld computer manufacturers could not be reached for comment, there are constraints both in the hardware and software that will most likely restrict Personal Journal use to the US, at least initially.

On the hardware end, physical connections and protocols in telephones from country to country are not standardised. Overseas, the user may not even be able to connect the unit to the telephone jack, though adaptors may be developed later to accommodate international phone systems.

The application software within the handheld unit may also need to change in order for The Personal Journal to operate outside of the US. Because telephone systems are different in countries throughout the world, the application software initially installed in the handheld devices may only recognise North American telephone signals.

Brian Riggs
Edittech International

Telecom to use attrition to shed jobs

Telecom CEO, Mr Frank Blount, has conceded that the carrier will use the natural staff attrition rate to shed up to 8000 jobs over the coming year.

"We currently have a very high staff turnover rate of anything up to 500 jobs a month. The decision means that we will simply not fill these jobs when they are left vacant."

The need for rationalisation is due to the radical shift the market has undergone in the last year. Telecom's loss of monopoly status has left it struggling to maintain revenue and market share.

"This government has chosen to introduce competition into a market which Telecom has dominated, so by definition, in the new situation, we are losing revenue. We have to do something to address that situation; we either have to get some of the business back in other areas, which we are seeking to do, or otherwise lose some expenses," Mr Blount said.

He affirmed that where possible the company would offer redeployment, and asserted that Telecom, like any other major corporation, had a responsibility to take care of its people. "Any company of this size has a social responsibility to the community in which it lives and works. Telecom is no exception."

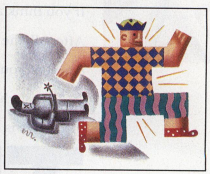
Helen Dancer

100 vendors join forces to create new tech support network

In an effort to provide a one-stop-shop for customer support questions, more than 100 vendors have joined forces to develop a global, independent, non-profit technical support alliance.

The TSANet (Technical Support Alliance Network) will establish guidelines and procedures that will enable members to work with each other's support organisations, share products and support information.

"We are first going to be rolling out TSANet out in North America, but we are already planning to develop and move the service internationally," said executive director, Dennis Smeltzer. "We first have to walk before we can run, but we know that there is a great need for this type of baseline service outside of the



US and we will soon be able to meet that need."

Based in Kansas City, Missouri, the TSANet will be run by a independent group, but will answer to a board of trustees made up of 10 companies such as Apple, Hewlett-Packard, IBM, Compaq, Lotus and Novell.

The TSANet is the first support alliance that is not "vendor centric," according to Smeltzer, and will provide a "baseline or foundation" that will serve as an all-encompassing technical support alliance that is open to all computer vendors.

The TSANet operations will be totally transparent when a user calls in, said Smeltzer, and will provide a single source of contact for customers calling in with technical support questions. "Instead of getting passed around or having vendors point fingers at each other instead of solving the problems," he added. Vendors that participate in TSANet will have a server running Lotus Notes at their locations that replicates a server located in TSANet headquarters. The server will provide support personnel with information about all of the various products and different companies to handle complex questions.

"Vendors who go the support route alone face a tough journey and the possibility of getting lost," said Bob Johnson, associate director of Software Support Research for Dataquest. "Today alliances like TSANet provide a quick and effective problem solver."

Mike Moeller
Edittech International

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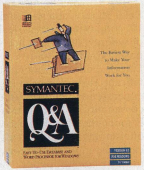
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NSW minister for Administrative Services, the Hon Anne Cohen, with Jtec chairman John Riedl and BT's Les Harris

Jtec takes ISDN to the UK

Local ISDN manufacturer, Jtec, has won a major contract to supply its J1000 series ISDN access controllers to BT plc. The contract was won from over 16 competitors globally, and is expected to generate revenues of up to $AUD40 million.

The contract follows, but is basically unrelated to, an earlier project awarded to Jtec by BT Australasia for the supply of ISDN multiplexers for the NSW government network.

NSW minister for Administrative Services, the Hon Anne Cohen MP, acknowledged the importance of the contract, both in the actual export value of the deal, and the potential it represents for the state to develop and sell its considerable telecommunications expertise.

Jtec's marketing manager, Keith Murray, asserts that the UK coup offers a great deal of synergy, furthering Jtec's push into the UK and Europe, and contributing significant Australian-bred ISDN expertise to the European community. "There is certainly much that Australia can offer in this field; our level of expertise in ISDN is recognised as being superior," he said.

The company already has a presence in the UK, which is focussed on service and support, and which will be expanded to gather and profit from valuable market feedback. A second operation in Ireland will concentrate on research and development of environment specific products. The research arm is consistent with Jtec's philosophy, according to chairman John Riedl. "An extremely strong commitment to high technology research and development is a cornerstone for Jtec. Operations overseas are no exception."

Very little alteration to the actual methodology is required however, Murray asserts, since the information transfer requirements between Australia and Europe are not vastly different. "People all over the world want to do basically the same things. Across 13,000 miles, it is the sameness that surprises me most."

Helen Dancer

Truthfully yours . . . Apple

If you believe an angry ex-director at Apple, there is more intrigue in Cupertino than there ever was in Dallas.

While it has been titillating to read about the shenanigans that have been going on, it's a little bit worrying to know that either Apple or its long-time director, Albert Eisenstat, are, as we say nowadays, truthfully challenged.

Remember all those 'did he jump or was he pushed' rumours that circulated when John Sculley moved from chief executive to chairman?

Well, he was definitely pushed in Eisenstat's version of events, which came out in late September when he filed a wrongful dismissal lawsuit against Apple and CEO Michael Spindler . . . on the very day he was fired from his position of executive vice-president and company secretary.

In the suit, Eisenstat accuses Spindler of double-crossing him after the two helped orchestrate the removal of John Sculley from the CEO job back in June.

Yes, according to Albert, the official version that Sculley asked to step down and hand-picked his successor is not what happened at all.

In a nutshell, he and the other directors plotted the ouster of Sculley for months, "because he wasn't focussed on the day-to-day business of running the company."

Apple, for its part, is sticking to the original version of Sculley's switch and says that Eisenstat is "factually and legally incorrect."

Now why has Albert broken ranks? Money of course. The man who owns $6.5 million worth of Apple stock and take-home pay of nearly $1 million last year is upset by what was offered to him under the executive severance package.

As Americans instinctively do in these cases when they don't agree with something, he reached for the telephone and called his lawyers.

John Sterlicchi
Edittech International

Compaq and Sequent on the verge of forming relationship

A technology-sharing relationship between Compaq and Sequent that is almost complete will give Sequent a pathway to the low-end marketplace and Compaq access to the higher-end.

While neither company would comment directly on the looming relationship, sources close to the companies said that the new relationship will be announced by the end of October.

"We are more than happy to buy outside of Sequent to take advantage of new or better technologies than just developing them ourselves," said Green. "We have built our business by making alliances and forming relationships with other leaders in the industry and certainly Compaq is a leader. It is highly unlikely that Sequent would ever develop something that it could buy more easily."

Gary Stimac, a vice-president of Compaq's systems division, acknowledged to reporters Sequent had some interesting technology and added that a relationship could take the form of a technology swap or an OEM pact. He would not discuss a possible relationship with Sequent in detail.

Sequent stands to gain from a relationship with Compaq by being able to attack the lower end server marketplace — an area in which it has not had much success, considering the cheapest server offered by Sequent starts at $US25,000. Compaq, on the other hand would be able to take advantage of Sequent's experience in multi-processing capabilities both with software and hardware.

"The teaming of Sequent and Compaq is a natural," said Tersa Elms, president of Elms Information Services Group. "It will give Compaq immediate access to Sequent's knowledge of multiprocessing as well as giving Sequent access into the lower-end server market."

Mike Moeller
Edittech International



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SYSTEMS

New IBM PS/2 servers to reduce bottlenecks

IBM's General Manager of Server Systems, David Saxby, was in Sydney this month to introduce the new PS/2 Server Model 95s. Introduced by Mat Featherstone, Brand Manager for IBM Australia, Mr Saxby claimed the new PS/2s use three new key technologies that will prevent 'bottleneck' server problems — the Syncostream memory controller, an advanced SCSI-2 device controller, and the ExpressPrint port.

The Syncostream controller is a chipset with a maximum speed of 422M per second, which IBM claims is nearly twice as fast as its nearest competitor, EISA. The SCSI-2 device is a dual-channel controller, capable of supporting up to 14 SCSI devices and contributing 20M per second data throughput. An optional variant of the SCSI-2 is available, with built-in RAID 0, 1, 5 data protection, plus 80M per second data throughput capability. The ExpressPrint port allows IEEE 1284 printer support as standard.

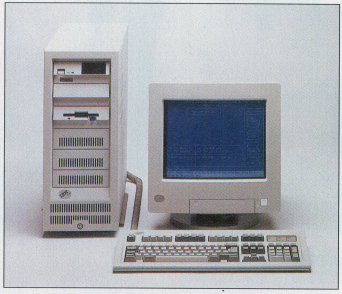
In addition, the new PS/2 Model 95 servers have 16M of Error Correction Code memory and 256K of Level 2 cache.

Using their CLARE emulation benchmark, and running against a Compaq Prosignia with similar configuration, IBM claimed the PS/2s were up to 72 per cent faster. Mr Saxby said that IBM's 1994 strategy was directed towards pushing the cost of overall performance down. "The management and tuning capabilities that are now only available in high-end servers will be made available to all servers in our range," he said.

The Model 95-466 range uses the Intel 486DX2 66MHz processor and starts at $12,695. The Model 95-560 Pentium-based range starts at $15,595.

For more information call IBM Direct on 008 815 154.

Nathaniel Tunbridge



IBM's new PS/2 Model 95 server range starts at $12,695

Dell sells to technotypes

Independent research carried out on behalf of Dell Computer has established the theory that Australians are less technophobic than their American counterparts.

The study reinforces the gender-based stereotypes that older women are less comfortable with technology in general than either their younger counterparts or men of a similar age. Technology, for the purposes of the survey, extended beyond computers and mobile phones, and into consumer electrical goods such as videos and microwaves.

Not only are Australians generally less technophobic, it seems 45 per cent of the surveyed population are keen to use the latest technology, whatever it is.

Dell has used the profiles created by the research to establish a series of technotypes, and fit its new product releases to these types. "One size fits all is an outmoded concept," said Dell's Australian managing director, Jeff Herrick. "Computers are for people, so different people need different computers."

Characteristically, Dell's research has isolated four types:

- The Techno-wizard, a techhead hobbyist who wants the best technology, is somewhat concerned about pricepoint but more concerned with losing his technological advantage.
- The Techno-to-go, a user who wants a switch-on and work machine, without wanting to understand how it works. This user is more concerned with what the machine can do than how it does it, and places a high priority on support and service.
- The Techno-boomer wants to be seen to have state-of-the-art technology. Price is part of the image, and the greatest concern is making the wrong decision.
- The Techno-phobe, who would rather wash the windows in Parliament House than approach Windows on the desktop.

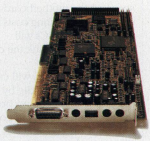
The survey also partitioned corporate users into two techno-types, the Techno-teamer, whose work processes must be shared with others and whose priority is a robust network; and the Techno-critical, whose work involves process-intensive procedures and who recognises the cost to business of a failure of the system.

With these user types in mind, Dell has released the NetPlex, a robust, fully featured, ready-to-go series of computers, and the OptiPlex,

You are about to see why

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The multiple AT-BUS CD-ROM interfaces support either Mitsumi or Panasonic CD-ROM Drive. When a SG adaptor is connected to the Mitsumi AT-BUS interface, the new card will also support SONY AT-BUS CD-ROM Drive. Topping it all is the upgrade option to support a wide range of SCSI CD-ROM drive and ability to daisy chain several devices.

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Built into the card is an option to upgrade to support PCM Wave-Table Synthesis. Simply add the Sound Galaxy WavePower onto the 16-BIT Stereo Sound Card, your PC literally becomes a stunning musical instrument.

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16-BIT Stereo Sound Card that allows recording from multiple sources like Stereo FM, Stereo Microphone, Stereo Line-in, Stereo CD-Audio and Covox/Disney Sound Source voices. Sampling range from 4KHz to 44.1KHz, the NX PRO 16 is able to capture and playback sounds with high fidelity. Its dynamic filtering will auto-adjust the filtering level for optimal recording and playback for superb sound clarity.

Plug in the MIDI interface and you are well on your way to creating musical compositions or even orchestrate a host of instruments from rap base to anything classical. Or simply plug in the joystick for an exciting game of bridges or soccer.

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Besides being feature-rich and producing incredible sounds, Sound Galaxy packs in extras such as HSC Interactive software for multimedia authoring, WINDAT™ OLE for audio edit, Monologue text to speech synthesizer, Audio Station, CD-Player, Utilities and Windows 3.1 drivers.

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for power users, techno wizards, and those whose major motivation for system purchase is absolute dependability. Priced from $2195, the NetPlex series is fully configured and has network software preloaded. "These machines are certified by any of the major network vendors to just switch on and run in a networked environment," said marketing manager, Denis Rowe.

The NetPlex range is based on an i486 chip, with options of 25MHz SX to 66MHz DX2 processors, and from 120M to 500M hard drives and up to 32M of RAM.

The OptiPlex is, according to Dell, the most upgradable machine on the market. "The i486 is upgradable to Pentium technology. We have catered for the addition of up to five extra bays, and if these are used, and extra power supply is required, even that is upgradable," Rowe said. The frame design makes it a simple matter for any user to complete these upgrades, while FlashBIOS allows a customer to upgrade by downloading the new software from the Dell BBS.

Priced at $4995, the top of the range OptiPlex XPS has a rating of 60 million WinMarks, according to Dell officials, offering the fastest video currently on the marketplace.

A range of specially priced options are available with both series until the end of November.

For more information, contact Dell on 008 810 676
Helen Dancer





The NetPlex and OptiPlex (right): different computers for different types

Manufacturing breakthrough to hit PC retail pricing

A new technology to cut PC design and manufacturing costs has distributors excited.

A Silicon Valley start-up has developed a new design method that cuts the time it takes to build chips by as much as 10 weeks, and may slash street prices of PCs by more than 10 per cent.

"This is the name of the game . . . drop the cost of the parts for a PC and the rest of the food chain will benefit," said Jeff Davis, director of new technology and products for Ingram Micro. "The saving is going to be seen all the way down to the street price, it just get passed down the line."

The new design method called High Density Array, created by Aspec Technology, based in Santa Clara, California, will enable semiconductor and PC manufacturers to build smaller, denser, more customised ASIC (Applications Specific Integrated Circuit) chips. The HDA design method is based on Sea-of-Gate ASIC technology, but according to Patrick Yin, vice-president of engineering, Aspec has taken the technology to the next level by making the ASICs design 27 per cent denser than any other Sea-of-Gate ASIC on the market.

Because it is more dense, ASICs built using Aspec's technology will be able to operate at a higher speed, use less power, and create less chip noise, said Yin, who would not reveal how Aspec had achieved the greater density. Another advantage to the HDA technology is that the ASIC will be smaller in size, which will allow semiconductor or PC manufacturers to incorporate three to six smaller customised logic devices with each CPU. By using the smaller ASICs, PC vendors will be able to save space on the motherboard and lower manufacturing costs because smaller ASICs will enable them to shrink the chip die size.

The denser ASIC will cut the cost of the chip die by close to 27 per cent, according to Aspec's CEO and co-founder Conrad Dell'Oca. "That translates into between 20 and 30 per cent cut in manufacturing cost and close to 10 per cent cut in the street prices of PCs."

The new start-up has already received the backing of Apple Computer, motherboard maker Appien, and semiconductor supplier Waitek. Samsung Semiconductor and Sanyo Semiconductor are among several ASIC suppliers that have signed on to use Aspec's HDA technology.
Mike Moeller
Edittech International

Intel will put Pentium in motherboards

Intel Corporation will be playing a larger part than expected in delivery of Pentium system design, because many PC vendors are allocating less funds to the development of machines optimised for the Pentium chip.

Harold Hughes, Intel chief financial officer, announced last week that due to few commitments made by vendors to spend money on system-design work, Intel will sell many of its Pentium chips to original equipment manufacturers (OEMs) in configured systems or on motherboards. Hughes said Intel wants to ensure manufacturers will take full advantage of Pentium performance in their boxes.



An Intel operator programs the computer-controlled microchip manufacturing equipment at Intel's Santa Clara facility

Although Intel would not disclose actual numbers, it is rumoured as many as one-quarter of the projected four to five million Pentium chips to be shipped will be sold on motherboards.

Mark Stahlman, president of New Media Associates, said Intel's approach will deter many vendors from simply plugging Pentium chips into 486-based architectures rather than designing units from the ground up. Many PC vendors do not believe that profit margins in the PC business are large enough to justify the cost of developing full-fledged Pentium systems, he added.

Intel, the sole manufacturer of the Pentium chip, could face competition in this market only from three other companies — Compaq, AST Research and Digital Equipment. AST has existing Pentium-based systems available, and is not commenting if a 586 chip is in the future. Compaq offers Pentium-based servers and a desktop to customers. Digital Equipment plans to continue the "strong relationship" it has with Intel by "producing and implementing the Pentium chip into its systems," said Michele Hoey, DEC spokesperson. Morry Marshall, an analyst from In-Stat, does not think there will be too great of an impact from Intel creating the system boards. "Intel's position is that other people don't have the technical or financial resources to design the boards, so they will do it for them. But, there is a feeling from the industry that Intel will just get bigger and bigger. However, it won't make any difference to the end consumer, they normally don't care whose board it is."
Monica Snell
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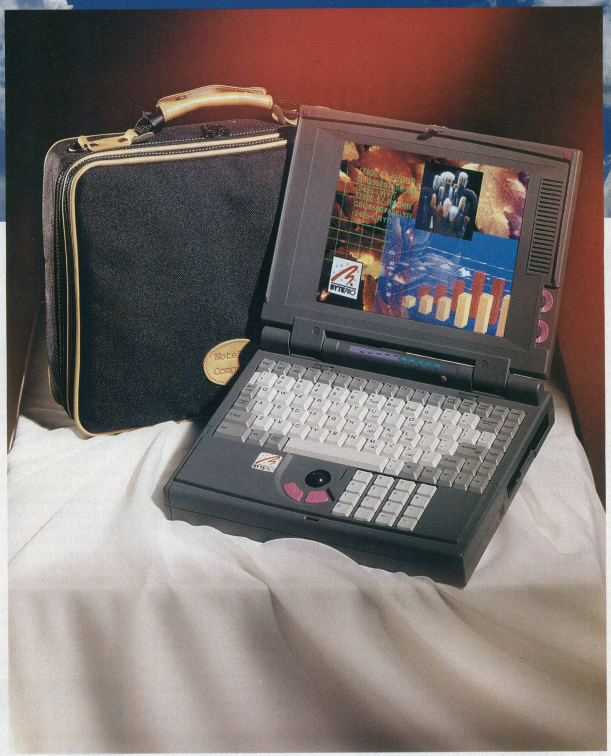
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PERIPHERALS

Compaq short on screens, NEC says no problem

A rumoured industry-wide screen shortage for active-matrix colour notebooks is a heat up, according to NEC, and is no doubt being perpetrated by those players whose products are affected. The likely agenda is to introduce enough FUD (fear, uncertainty and doubt) into the marketplace to disturb buying patterns until supply has been re-established.

Compaq has sent a letter to its reseller channel advising that a shortage of active-matrix colour LCD screens may cause significant delays in shipments of its Contura 4/25 CX Model 120 and LTE Lite 4/33C Model 209, and to a lesser extent the Contura 4/25 CX Model 209. IBM is also reputedly experiencing similar supply problems, but the company could not confirm either that the problem existed or that stocks were adequate. Both vendors source screens from Sharp, as do many other players in the active-matrix colour notebook market.

Contrary to the letter's claims that the problem is "fast becoming an industry-wide one" and that it is caused by overall demand exceeding supply, competitor NEC asserts that it has no problem with supply, and that all orders for its popular UltraLite Versa range are being met on time.

NEC manufactures its own screens at its factory in Akita, Japan, and the company currently estimates that it will soon have the capacity to meet the worldwide demand for active-matrix colour screens on a monthly basis. The company plans to spend close to ¥30 billion on a new production line for LCD screens, a project that will see the plant shipping in volume by the end of next year.



The NEC UltraLite Versa: no waiting required, despite screen scare

In the meantime, NEC ISA's Norm Hall is adamant that the supply problems being experienced by his competitors have not flowed on to NEC. "Currently we have no trouble filling orders in New Zealand and Australia, or anywhere else in the world, for that matter. Anyone who wants to buy an UltraLite Versa with an active-matrix colour screen will find that they don't have to wait."

Helen Dancer

HP follows market to low-priced laser

Extensive market research which proved that 'personal' was higher on the wish lists of most prospective laser printer buyers than 'powerful', has led Hewlett-Packard to introduce a new, lower cost, four pages per minute laser printer.

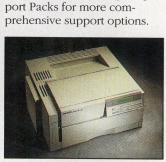
The new printer models, styled on the HP LaserJet 4P and 4MP, offer true 600dpi resolution, and will print on a wide variety of paper sizes and weights, including a comprehensive range of recycled papers. Both feature proprietary resolution enhancement technology to refine the clarity of images and improve the tonal range of the printer's output.

The HP LaserJet 4P is suitable for DOS/Windows users and offers 35 Intellifont and 10 TrueType scalable typefaces. It comes with enhanced HP PCL 5, 2M of memory expandable to 26M, and memory enhancement technology. The printer has an optional Adobe PostScript SIMM.

The HP LaserJet 4MP, for Windows and Macintosh users, offers more comprehensive functionality, fitted standard with 6M of memory expandable to 22M, 80 scalable typefaces and auto language switching, Adobe Level 2 PostScript and enhanced PCL 5, two SIMM slots with hot I/O switching on the processor, LocalTalk, and serial and parallel interfaces. The 4P is based on a 16MHz Intel RISC processor, while the 4MP's engine is based on a 20MHz chip.

Both printers carry the EPA's Energy Star designation for lower power consumption, powering down to 10 watts in standby mode, and featuring a toner-saving feature called EconoMode, which reduces toner consumption by up to half by printing in draft mode.

Standard warranty for these printers is a limited one year. The company offers a range of Diamond Edge Support Packs for more comprehensive support options.



The HP LaserJet 4P and 4MP. Personal printing is more important than super power

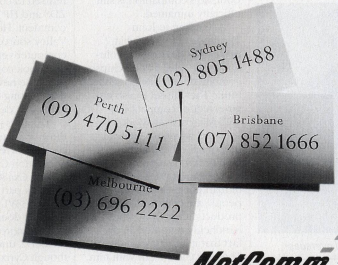
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Priced at $2199 for the 4P and $2719 for the 4MP, these printers are available now.
Helen Dancer

Export advantage in Australian dollar

Australian developers are at a significant export advantage because of the relative value of the Australian dollar in European markets, according to Microfax managing director, Ian Buddery.

The Australian designed and manufactured intelligent fax modem is in its second revision, with enhancements based on the company's ongoing development, and plenty of feedback from users around the world. "We have sold just on 1400 units in Australia, 500 in Hong Kong, 800 in the UK and around 200 in New Zealand, and have shipments pending in Germany, Poland and Singapore," Buddery said. The delay in shipments to these new markets is due to telecommunications approval processes required for each country, which are proving to be frustratingly slow and rort-laden.

"Telecommunications approvals are really an issue of tariff, a bureaucratic process with a hidden agenda — that of reducing imports," he said. "The British system of approvals involves a bizarre junket whereby we must meet the expenses for two officials to fly Business Class to Australia to inspect our factory. More often than not, first applications are rejected, more or less as a matter of principle, which means we have to go through the process again."

Once achieved, however, Buddery asserts that telecommunications approval opens up the gateway for Australian developers to excel. "In Europe, because of the low value of the Australian dollar, we are absolutely at line ball with any of the competition. In fact, we are in front, with the nearest competitive model made by the French coming in at Fr2995, (close to $AUD1000). There is no hindrance on price. The position for any technology exporter is excellent."

The comparison comes because Microfax is at the higher end of the price spectrum in Australia, causing speculation that cost is holding it back. The company forecast sales of up to 1000 units/month when the product was introduced in March. While these targets have not been reached, Microfax has done well in establishing itself both here and overseas in a difficult buying climate. "Instinctively, I feel that dealers, who are pressed to the limit to get the bottom line down to the lowest possible level, may choose a less-featured product in preference to the Microfax, simply to win the sale," Buddery said. "But in our own sampling of people who ring us direct for information or to find out where they can get one, the price/feature set balance seems perfectly alright. Most people become remarkably attached to them, and find that after a couple of months, their Microfax has become an essential, rather than a luxury."



Microfax, made in Australia, competing head-to-head overseas

The new version Microfax retails for $495 and is available from Coles/Myer outlets such as Grace Bros, and also from Harvey Norman.

Microfax an be contacted on (02) 965 7230.
Helen Dancer

Four combine for Compaq's companion

Compaq announced plans for a new handheld 'mobile companion' at Innovate '93 (September 14 to 17) in the US. The companion represents a combined effort from Compaq, VLSI, Intel and Microsoft, and is scheduled for availability in the middle of 1994.

The term *mobile companion* was coined by Compaq to differentiate its product from PDA's and other personal communicators. Compaq's companion is still officially unnamed.

According to John Thompson of Intel, what makes this device so revolutionary is "VLSI's Polar chipset combined with Intel's architecture." The chipset is also engineered for compatibility with Microsoft At Work, software which integrates traditional office machines with desktop computers.

Jim Farrell, VLSI's director of marketing, said, "A lot of people are confused. This product differs from other handheld computers in the fact that it is a companion. The user takes work with him, and at a later time inserts it into the desktop. It is not meant to stand alone." Three of the ways the user will be able to transfer the information to the desktop will be: HP's serial infrared; a cradle; and a cellular link.

The companion will use a pen interface for control, with a keyboard option. "There will be some handwriting recognition, but it will not be primarily based on this. Since the mobile companion is so small, it will be stylus-based, mostly on a touch screen," said Karen Andring, a spokesperson for Microsoft.

Compaq, Intel, VLSI and Microsoft are offering their separate contributions on the open market. Last week Microsoft and Toshiba entered a partnership regarding Microsoft At Work.

The terms of the agreement were not disclosed. VLSI will offer the Polar chipset at $US50.00 in quantities of 10,000. Intel and Compaq have agreements that will be announced at a later date.
Monica Snell
Edittech International

Zenith quiet on Cyrix plans

Cyrix's work on the development of a new 486 microprocessor has landed it two new customers in Zenith Data Systems and Hewlett-Packard.

Cyrix confirmed the two companies were customers for its new Cx486DX, but refused to comment further. ZDS and HP also refused to comment. However, Silicon Valley sources expect the two computer vendors to release notebook computers first using the new chip rather than putting the powerful chips into desktops.

Zenith is just releasing three 486-based notebook computers featuring first-generation Cyrix chips — the 33MHz Cx486SLC. The Cyrix chip is a part of Zenith's new Z-Star 433VL series.

Cyrix does not expect to put out more than 100,000 Cx486DX units this year. Although Cyrix does anticipate an increase in its market share, it does not expect it to be explosive. "We aren't putting out the quantities Intel has," said Katherine Dockerill of Cyrix.
Monica Snell
Edittech International

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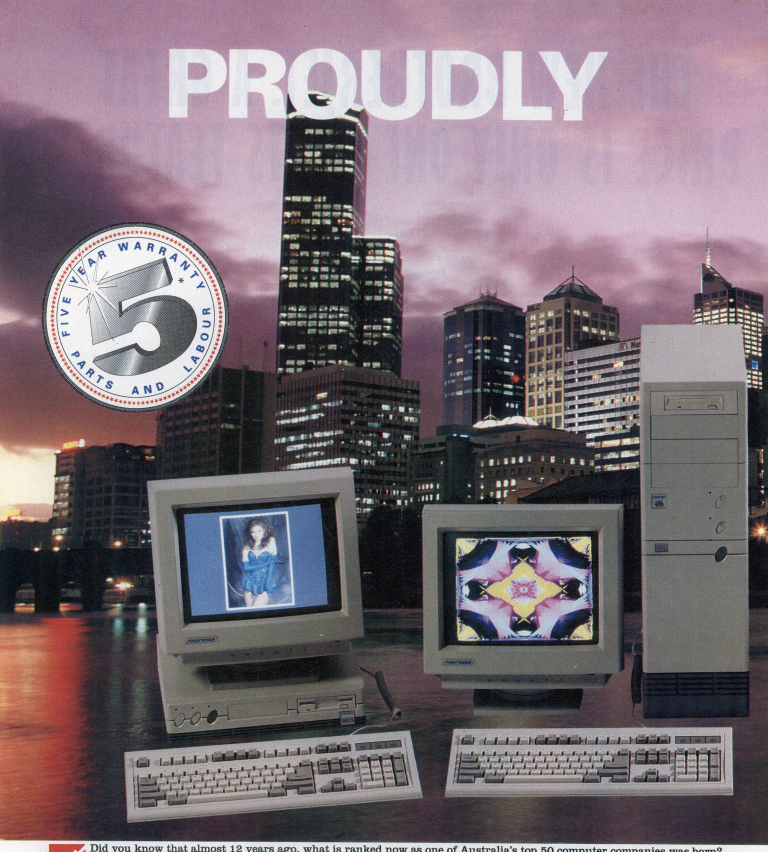
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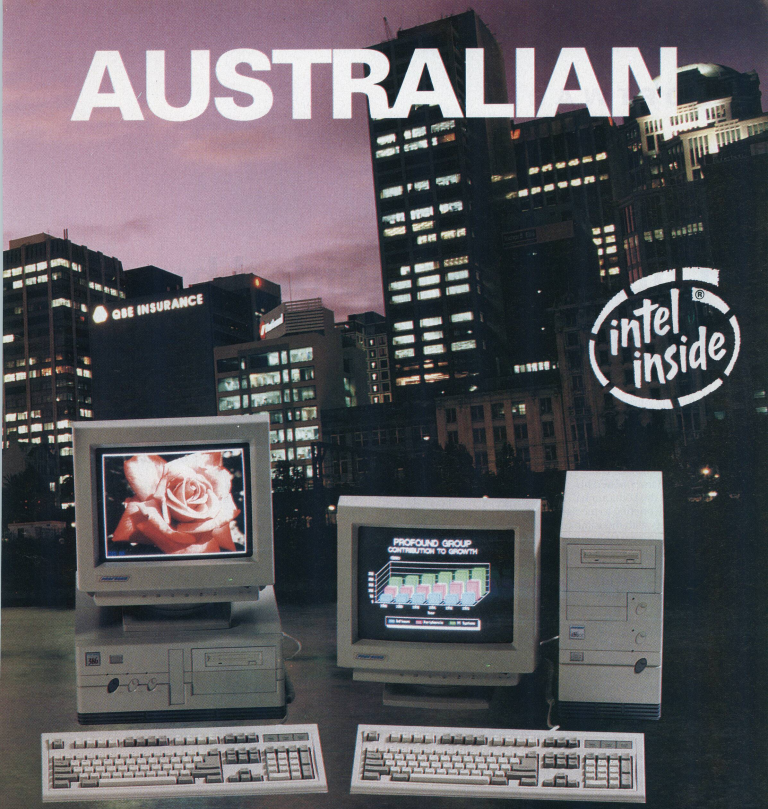
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SOFTWARE

Lotus vision guided by fixed star

Any journey, according to US president, Bill Clinton, must be guided by a fixed star. It was with this maxim in mind that Lotus CEO Jim Manzi opened his remarks at the Lotus annual technology briefing to media and analysts with the gambit: "We have no new tangents, no new desktop TVPCs. We have not invited you here to launch a version of Notes to run on your household appliances."

The undercurrent of the lighthearted approach was to reinforce the company's strategic direction as a leading provider of business software. Not swayed by the industry's move towards wooing consumers and the widespread interest in early release PDAs, Lotus has reaffirmed its business base, with vice-president for International Operations, John Landry, asserting the belief that there's "more to computing than fixing lunch dates." The current rash of PDAs bears too much resemblance, he said, to early forays into pen computing, which have the aroma of failure. Lotus has yet to find the PDA worthy of its software, choosing instead to align itself with the HP palmtop, the HP100LX, which it says fills more of the criteria set by mobile users. The 100LX's predecessor, the 95LX, was



Jim Manzi: "80 or 90 per cent of people who try Notes, buy it"

developed by HP with significant input from Lotus, and was revolutionary in its ability to run Lotus 1-2-3. Having established the aim of leading the field in integrated applications and workgroup computing, Manzi said the challenge faced by the company was a self-oriented one: "How well we're executing on what we're trying to achieve."

The past year, according to Manzi, has been characterised by a significant downturn in the market for DOS software, for which Lotus, as with all other applications providers, has taken a severe body blow. The sales of Windows versions of Lotus applications have, however, compensated for this loss, but the communications products accounted for the greatest growth and future potential, with Manzi estimating that by the end of 1994 the combined revenue from cc:Mail and Notes could be in the region of $US250 million.

Future-tech offerings showcased during the briefing included an experimental foray into Notes video, point-to-point campus-based video conferencing, and Screen Cam, a user-teaches-user facility which allows workgroup members to record and demonstrate computing procedures. The Screen Cam-based tutorials can then be played back on machines which do not have Screen Cam installed, because they are simply packages of information, rather than being application based.

Closer to delivery were updates to cc:Mail, including the cc:Mail remote version under Windows, which addresses almost all the frustrations currently suffered by remote users, wireless email, and email/pager/fax liaisons, which allow the mail message to be re-routed to a nearby fax machine on request by the mail recipient.

Commenting on the success and long gestation period of Notes, Manzi commented that "80 or 90 per cent of people who try Notes, buy it. That is a pretty good indication of how significant the product is going to be." Lotus Notes will become in the medium term, he believes, the place where client/server computing users will 'live' to co-ordinate and communicate their business day.

Helen Dancer

Australian designer wins award, releases new version

Australian software developer Graeme Taylor has won the Microsoft/Fawcette Technical Publications award for the Best Small Windows Application Developed in Visual Basic, for his Software Licence Monitor, (SLM).

The product's full title, Software Licence Monitor for Windows Networks, adequately describes its function; it is designed to manage access to applications across a network, restricting the number of concurrent users to the number of legal licences held by the company. PCs are a notoriously easy way for unauthorised applications to creep onto the network, and be reproduced on other machines, leaving the company open to fines by the BSAA of up to half a million dollars. The network manager bears the responsibility for the legality of the network, often without the resources to properly control the environment. SLM will report how many occurrences there are of each application on the net-

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work, and match the number and type with the legal licences held by the company. It will then restrict access to any users in excess of the legal limit, or report to the network manager that an infringement or irregularity has occurred.

The product was originally designed as a response to problems at his 'day job', that of network manager at *Datacraft*, such as the risk of breaching copyright, but since leaving the position to make SLM a full-time business opportunity, Taylor has revised the product and Version 2 is now available.

The upgrade contains significant enhancements based on feedback from users, as well as his own development ideas. These include a queuing system for users restricted because they exceed the number of licences, and an automatic message to those desktops which have the application iconised, asking these users if they can free the application up to be used by the next person in the queue.

Software auditing tools is apparently an Australian area of expertise, according to Philip Berner of Checkmark Technologies, the company which supplies SLM, and also Print, software auditing for DOS and Windows, and a range of software auditing tools for the Macintosh platform. "Print was designed by an Australian, but he had to take it to the UK to get anyone to take any notice. Now it is recognised as a British product, but the genesis of the software is Australian."

Taylor concurs, citing his futile conversations with Austrade when seeking support and assistance to export SLM. "When you are a single developer, you need to prove that you have so many millions of dollars behind you before they will consider helping. You are far better off doing it yourself," he said.

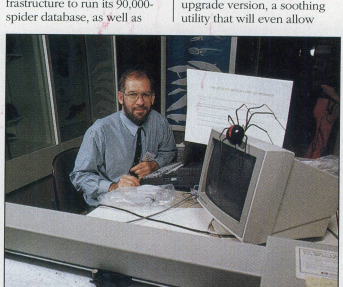
For more information about SLM, contact Checkmark Technologies on (02) 957 6970.

Helen Dancer

OS/2 arrests arachnids

Australian spiderman, Dr Robert Raven, reports a near miss from a spider plague outbreak. His weapon against the deadly infestation? OS/2 2.1.

Dr Raven's department at Queensland University uses OS/2 2.1 as an operating infrastructure to run its 90,000-spider database, as well as developing complex research documents. The benefits are diverse. "It's better than a boot or a rolled up newspaper," the good doctor's assistant was heard to exclaim, just before he disappeared down a suspicious-looking funnel, installation disks one-through-32 clasped in his fist.



OS/2 is better than a boot or a rolled up newspaper

Under licence negotiations with Mortein, Pea Beau and Defender snail pellets (the enterprise-wide version), IBM has revealed that it is the robustness of OS/2 2.1 which has saved the doctor so much trouble. "Repeatedly dropping the PC on the ground was a risky proposition. He knew his data was at stake. But you can hit so many more spiders with a whole PC than even a boxful of OS/2 disks, that it was a chance he had to take. OS/2 2.1 shone through, however, and didn't crash even when, in aiming for a couple of huntsmen way across the room, he hurled the PC so far the cord flew out of the power point," an IBM insider confided.

A special software developer's antivenene will reportedly form the basis for the upgrade version, a soothing utility that will even allow programs such as Borland's Paradox and Lotus 1-2-3 to co-exist happily on the same hard drive.

In a totally serious aside, Dr Raven is one of Australia's foremost arachnid researchers. His department uses and endorses the power of OS/2 2.1 to manage its considerable research endeavours into preventing and treating serious spider bite. OS/2 2.1 is particularly valuable, he says, in managing resources in the department's predominantly 386 environment, and on the sundry portables used for field research.

Helen Dancer

Lotus spreads Notes infrastructure with consultant program

Lotus is widening the human interface of the Lotus Notes infrastructure, establishing a new dimension to its diversifying user/developer/reseller channel.

The consultant and developer program is aimed at the growing number of individual people, as well as small companies, or business units within larger organisations who are finding value in Notes as a revenue earner, not simply as an internal business tool.

Lotus Notes consultants and developers have become a sub-industry, often catering to distinct vertical markets or particular application types, finding and giving value in an ability to direct particular expertise to a Notes-based solution.

"We are finding that a lot of the organisations sending people to the course are those whose work is evolving into the kinds of business process re-egineering projects that require Notes-type solutions, either explicitly or implicitly," said program manager, Peter Philippsohn. "Consultancies tendering for work are increasingly needing to take on the kinds of workflow management skills and extended enterprise concepts that Notes not only embodies, but provides."

Once trained, consultants and developers receive referrals for new work through Lotus, and have access to the growing Lotus network, including discussion databases, new information and beta releases of new product.

The Notes C&D training fee is set at $1000 per annum, plus a $50 annual fee per consultant. Consultant training for a two-day course costs $600, while the five-day course, for primary consultants, costs $1500. Client and server editions of Notes are included in the package, as is a Notes gateway or companion product.

More information on the program can be obtained from APPCON, (02) 337 4011.

Helen Dancer

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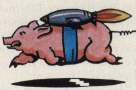
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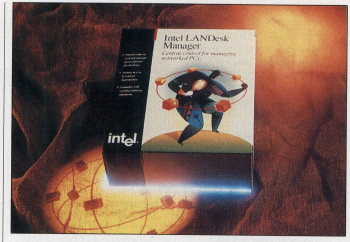
Intel releases new range of Smart Networking Services

Intel has announced the availability of a new range of intelligent networking products designed to take the company out of its traditional role as a chip vendor. The introduction of the networking adaptors and network manager cards sets Intel on a dual stream, as provider of both ingredient products and branded products, according to the company's Australian managing director, Geoff Healey.

Problems typically faced by LAN administrators and designers involve issues of bandwidth and day-to-day management of LANs. Long term, Intel believes, Ethernet will not remain the medium of choice, though it remains the most pervasive topology, with an estimated 250,000 Ethernet adaptors sold this year.

"At the Internet level, LANs and their users are well taken care of," says international marketing manager, James Smith "But at the local LAN level, there is still a lot to be desired in terms of robustness and overall dependability. Who better to rely on then, than Intel, since our chips are in most of those PCs."

Intel proposes that its Smart Network Services products will take the paradigm of LAN administration from the reactive, through to a predictive stage and on to a proactive realm, where intelligent network management will reduce the time network managers must spend resolving problems such as 'why can't I print from my machine to the network printer?'



Included in the intelligent products announced are a range of EtherExpress Flash32LAN adaptors, StorageExpress ELD backup server, and the LANDesk manager, software which enable the LAN manager to take over a problem workstation and resolve the problems without leaving their own desk.

For details and pricing of the range of products, contact Intel on (02) 975 3300.
Helen Dancer

New wireless LAN send data as fast as wired LANs

A small Los Angeles-based startup is set to debut a wireless LAN that offers comparable performance to traditional wired LANs.

Wi-LAN Inc. will use the NetWorld trade show to capture some air time for its demonstration of its 20Mbps 902-20 Wireless LAN. Set to ship early next year, the company is positioning the new product to compete with the traditional Ethernet and Token Ring marketplace.

Priced at approximately $US1500 per node, the LAN operates at the direct sequence spread spectrum 902-928MHz ranges and will support Ethernet initially and Token Ring technology in the future.

The technology actually gives users 1.5Mbps throughput but has an aggregate transmission rate of 20Mbps, according to company officials. As a comparison, NCR's WaveLAN or Motorola's Altair have an aggregate throughput of only about 2Mbps.

Using a patented technology to keep the wireless signal strong, 920-20 does not need to retransmit the data repeatedly. According to company officials, it uses a technology similar to code division multiple access, a method that gives each user a code to send and receive data. Each code uses a separate part of the radio spectrum — that does not make the data move faster, but gives it more room to move, thus improving performance.

The network will support distances up to 27.5m from a host transmitter when sending data through walls or concrete floors and up to 915m when transmitting in open spaces.
Mike Moeller
Edittech International

Zenith rolls out interface for PCs to act as interface to cable TV

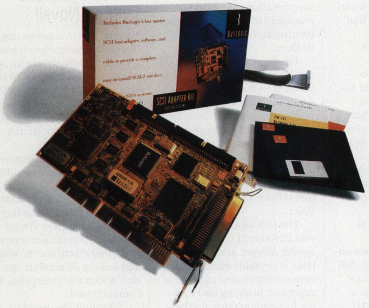
Link into a LAN from your TV . . . that's what Zenith Electronics in the US says its HomeWorks technology can do. It will enable data to be transmitted on coaxial cable and co-exist with other services.

The product is slated to interoperate with interactive applications including home office resources, as well as electronic resource services in health care, financial and legal sectors, the company said.

Zenith spokesperson, Edward Zylka, said the HomeWorks model PCTV-R is expected to be shipping iin the US by January for $US495. The product consists of a gateway card which communicates through a proprietary interface to an external radio-frequency modem. The modem transmits and receives using standard cable TV channels and can transmit at rates of 0.5M bits per second.

"HomeWorks is targeted at

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cable TV operators as a high-performance, low-cost alternative to telephone, modems and ISDN systems, and equally important, as an incremental source of revenue," Zylka explained.

Because it is possible to configure four subnetworks on one cable TV channel, entertainment video and data services can be broadcast simultaneously on the same channel, Zylka said. Standard video, point-to-point data, telephone bypass information, video teleconferencing feeds and other telecommunications services can co-exist on the HomeWorks system, he explained further.

Network operating systems supported by HomeWorks include those from Novell, Microsoft, IBM and others. Software drivers for the networks are included on the gateway card, and the system is designed to provide an operational range of up to 161km, the company said.

Ann Steffora
Edittech International

DEC licenses NetView/6000 from IBM

In a rare move, DEC has licensed IBM NetView/6000 technology to create its own networking management product, PolyCenter NetView.

The partnership is expected to make the development of network management applications for the technology more appealing to developers. As well, it will help both vendors and users to circumvent the long wait for the Open Software Foundation's Distributed Management Environment (DME).

According to a spokesperson for Ki Research which sells DEC network management applications on a variety of platforms, this agreement will make things a lot easier on third-party developers because of the common platform between DEC and IBM.

DEC and IBM said they will roll out a version of NetView/6000 that combines the DEC OSF/1 operating system and DEC's new 64-bit Alpha AXP hardware in the first quarter of next year. A future version of PolyCenter NetView will run on DEC's new OpenVMS operating system as well, DEC said.

The partners said they are reacting to their users' and applications developers' needs, who want distributed management systems based on the Simple Network Management Protocol.

Both DEC and IBM will continue to sell their proprietary management systems, which include IBM's mainframe-based NetView and DEC's VAX/VMS-based PolyCenter.

The partnership will lead to platform consolidation and applications integration that rivals the technology proposed under the DME, analysts said.

According to John McConnell, vice president of Infonetics Research, a consultancy firm in the US, "What IBM and Digital are doing will allow users to see some of the promise of the DME."

"It's not DME, but it gives you an idea of the potential of a common applications environment. In a sense, it makes DME irrelevant," McConnell said.

At the news conference announcing the partnership, Bill Warner, director of network and systems management at IBM said, "Today is the day that IBM and Digital have declared an end to the platform war."

As well, Digital's vice-president of production systems software, Rose Ann Giordano, said the applications framework is essentially the same, but DEC is replacing the engine.

Ann Steffora
Edittech International

Virtual LANs are a new networking concept

A new idea in networking called 'virtual LAN' is driving the development of new hubs from some of the networking industry leaders such as Alantec, Ungermann-Bass and SynOptic.

The new hubs differ from traditional hubs because software, not cables or wires, determined how a LAN workgroup is set up. Lori Lux, an Alantec spokesperson, said, "Virtual LAN comes in when you want to group workstations logically rather than physically."

VLANs differ greatly from physical workgroups in that the members can be distributed throughout a LAN, spanning multiple hubs. But they are similar in that they both allow users connectivity and a shared domain. VLAN support allows network managers to optimise network bandwidth by managing traffic flow.

One way to create a VLAN requires that a switching hub be used to connect the LAN's users. An alternative is called port switching. Port Switches allow any port to be associated with any backplane segment via software commands to the hub. SynOptic provides port switching in its first release of Lattis System 5000.

The first VLAN support was introduced over a year ago by Alantec in its PowerHub. It contains a local internetworking engine capable of aggregate bridging and routing forwarding rates at Ethernet and FDDI wire speeds when simultaneously operating 12 Ethernets and two FDDIs. The forwarding rate exceeds 80,000 packets per second and has approximately 12 microseconds per packet."

Ungermann-Bass' DragonSwitch module for the Access/One hub is conducive to VLANs and supports eight or 16 Ethernet ports with 10Mbps performance. It switches traffic across the high-speed PlusBUS backplane in the Access/One Enterprise Hub. Five of the modules delivering 40 concurrent conversations at full media rate can be supported in a single Access/One hub. The Access/One DragonSwitch starts at $US900 a port.

SynOptics has recently entered the market with the announcement of its Lattis System 5000. It is a highly flexible modular hub that supports network segments and provides more than 12Gbps of system throughput. The individual hub provides connectivity and core network management capabilities for up to 52 Ethernet segments, 26 Token Rings or five FDDI rings.

Monica Snell
Edittech International

Banyan gets one over on Novell

Banyan Systems got an edge over LAN-leader Novell when it recently brought out an application to enable VINES network operating system (NOS) administrators to distribute applications software to users across the network from a single site.

Enterprise Data Distribution (EDD) enables users to manage the deployment or retrieval of all kinds of computer-based data, including new applications, software upgrades, remote site reports and other electronic information among all network servers within the enterprise, the company said.

"Through the use of integrated enterprise network services, Banyan is offering a cross-platform computing solution that gives NetWare, Unix, and VINES users what they need," said Timothy O'Brien, contributing editor for Patricia Seybold's Distributed Computing Monitor, based in the US.

Banyan EDD will be available early next year for VINES, ENS for NetWare, and VINES for Unix. Sources close to the company say support for Microsoft's NT is right around the corner as well.

Ann Steffora
Edittech International

Title fight: Word 6.0 for Windows vs WordPerfect 6.0 for Windows

According to both statistics and anecdotes, the typical word-processing user spent their DOS life using WordPerfect, and switched to Word when they moved to Windows.

WordPerfect was slow to market with a Windows product, and when it arrived it was inferior and disappointing. The updated Version 5.2 had some nice features, but it looked and worked like an interim solution.

Microsoft meanwhile, released a gem in Word for Windows 2.0, and has recently been running ads in the US claiming that Word has taken the crown from WordPerfect as the world's number-one package.

Both companies claim that their new releases, both versions 6.0, are based on extensive usability testing and were designed with the primary goal of fulfilling customer wish lists, with particular attention given to the current WordPerfect for DOS user base. They are very different packages, however.

In this review, we have concentrated on operation and principal in preference to analysing their full 30M feature sets. A Sharp 486SX/25 PC-7700 notebook with 4M of RAM and 124M drive was used to test the software. WordPerfect was in Beta, and Word for Windows in 'Preview' for our tests.

Modular or standalone?

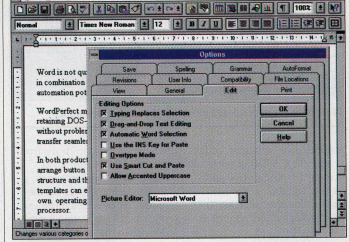
WordPerfect's emphasis is being the user's work environment, providing the tools people need most of the time to complete documents. Word for Windows is a component of Microsoft's modular vision of document processing, in which the user combines specialised applications to produce a compound document.

Microsoft Word for Windows is part of the Office 4.0 suite, built to work especially closely with Excel 5.0. Object Linking and Embedding (OLE) 2.0 allows you to place a spreadsheet in a Word document, and then instead of exiting back to Excel to edit it, you can work in-place on the page in Word, with the toolbars and menus changing automatically to those of Excel.

WordPerfect achieves the same effect, but the spreadsheet module is part of the application itself. While it's fully functional, and can import data from most database and spreadsheet formats flawlessly, it clearly can't compete with Excel.

Working on a spreadsheet in WordPerfect is still easier than in Word. This isn't to say that OLE 2.0 isn't slick — it is, and it's the future — but a built-in module remains easier to use.

On Microsoft's calculations, basic and intermediate users account for 70 per cent of users. Of these there would be a percentage who also work on a basic-to-intermediary level in a spreadsheet, and would prefer to manage their worksheets in a full package and import the results when finished. For these people — and I count myself among them — OLE 2.0 is a boon, and WordPerfect should add support as soon as posssible.



Word for Windows has a history of being first with the goods

Grammatik is now properly integrated in WordPerfect, rather than working clumsily as a separate application as it did, so both packages offer equivalent capabilities for spelling and grammar checking, thesaurus, and the drawing and charting components. They also offer gimmick modules such as word wrapping to a graphic. The prominent differences are in table features, with WordPerfect incorporating a full spreadsheet module, and in document management, where WordPerfect again sets a standard.

Word, by comparison, has limited table functions, and abysmal file management, but has single-click embedding of Excel worksheets, and advanced data manipulation calls to Access. It also offers document routing, with automatic revision marking and updates, via Microsoft Mail.

Interface and editing

Research papers on usability from both companies suggest that the bulk of any user's time is spent working with a limited subset of any given application's features. Simple changes at the screen-face have greater impact than significant improvements in functionality at a deeper level.

The most useful features of both are easily accessed onscreen. Reworked interfaces optimise screen real estate, and previously static status displays and icons are now 'hot' or dynamic. WordPerfect's interface has advanced further than Microsoft's, although admittedly it had further to progress.

The previous version of WordPerfect for Windows was a user's nightmare. The company made the mistake of trying to ease its DOS fans gently into Windows, and the interface became lost somewhere between. Version 6.0 has been rebuilt, with sensible defaults and a pleasant layout. A host of small attributes have been reworked, rather than one or two obvious features, and it now feels and works like a true Windows product.

The ButtonBar palette — to which you can assign multi-

ple sets of macros, features or external files — has been joined by a mini-icon-sized Power Bar, where icons can act as drop-down menus depending on context. The font icon drops down a list of available fonts, for example, instead of switching to a font dialogue box.

QuickMenus, invoked with a right-mouse click, are easy to use and effective, allowing for fast single-action cut, copy and paste, instant spell-checking, and format painting — where you essentially copy the format attributes of one area of text and 'paint' it onto others, very much like the QuickFormat pioneered by AmiPro. They are context sensitive; right-clicking on the ButtonBar, for example, drops down a menu of button sets.

Microsoft has retained the look and feel from the popular interface of Word for Windows 2.0. There is greater use of shading and 3D to denote display, and toolbars are now fully configurable. The status bar is dynamic, invoking 'Go to', and quick access to Revision Marking, Macro recording, and WordPerfect-user help. Scroll bars are accompanied by quick-switch buttons between Normal, Page and Outline views, and in Page view a vertical ruler is now also displayed.

Word for Windows has format painting, although its QuickMenus provide access to format dialogues rather than fast formatting. Both Word and WordPerfect have the clean-screen mode pioneered by Lotus for text-only work, although Word used with Office 4.0 leaves the Office button bar obtruding across the top of the display.

Both have added drag-and-drop interface configuration, and right-mouse-click quick-access menus. WordPerfect goes further, however, with drop-down menus from icons in its Power Bar, and its QuickMenus are more intelligently context sensitive.

Microsoft's editing improvements are superior. Text selection now extends automatically by the word rather than by character, which can be annoying, and it has up to 100 levels of undo and redo. You can even scroll back through the list of changes that have been made and choose to redo or undo any one.

Word's new Autocorrect feature is brilliant, allowing the user to define combinations of characters that are automatically replaced while typing. This is useful for fixing standard typing errors, such as 'teh' for 'the', or for boilerplate text, such as '(r)' for the Registered symbol. It may also be used, in effect, as an instant glossary, where instead of typing *Australian Personal Computer* every time it's needed, one might just type *APC*.

WordPerfect has Abbreviations, which can hold text, formatting or graphics, but the expansion is manually activated. Word for Windows offers a similar feature called AutoText as well as AutoCorrect, where the abbreviation is also manually expanded.

Find-and-replace functions are generally improved. In Word, you can now search with pattern matching, or for 'sound-alikes', and also by formats. WordPerfect allows you to find and replace formatting as well as text, but is not as sophisticated as Word.

Both products support drag-and-drop editing, and double-click selection of words. Microsoft has added triple-click selection of paragraphs, and WordPerfect triple-click sentence selection and quadruple-click paragraph selection, plus menu selections for page and document, or tables.

WordPerfect uses cascading or hierarchical menus, where a submenu drops from the side of a higher level menu. With this approach, a single click and drag on the menu bar provides more explicit access to buried functions than the traditional dialogue-subdialogue method favoured by Microsoft.

Word for Windows uses Tabs in dialogues, providing fast access — by clicking on different Tabs — to as many as 12 related categories within the one display, with the appropriate dialogue contents for the selected Tab.

WordPerfect uses Control Panels for preferences, and radio buttons for a similar effect to Word's tabs. WordPerfect's hierarchical menus make it quicker to access a desired feature, but Word's tab system is easier for switching between related settings.

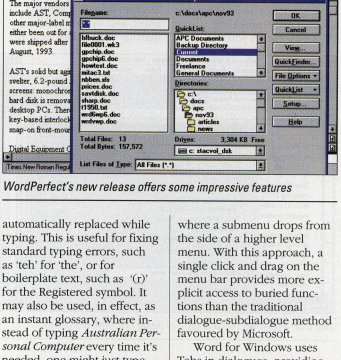
Although Microsoft officials claimed that the kernel in Word for Windows is as lean if not leaner than the previous version, a supposed benefit of modular operation, it felt slower than Version 2.0. File saves are visibly longer (you now see a tracking bar during Save), and file sizes for simple documents have doubled. Turning off undo levels and autocorrect sped operations.

WordPerfect appears to run as much as twice as fast as the previous version for standard operations, although you'd hope this to be the case, as 5.2 was a notorious slug. With only 4M, external modules and even standard file and clipboard operations resulted in tardy response.

To be fair, this was beta software, and code optimisation before final release should improve performance. WordPerfect bluntly advises at least 6M. As a bulk of users are on machines with only 4M of RAM, however, this is a serious consideration, even if, as WordPerfect claims, the presence of fully functional extra modules like the spreadsheet negates the need for separate applications.

Using the product on 486DX/33 with 8M of RAM made a significant difference.

Overall, Word had a faster feel for basic editing operations, and shares limited RAM robustly with other applications. Full benchmarking on final release software is likely to show that while Word has lost its blitzing speed for basic operations, and WordPerfect has caught up, there is still a gap to Word's advantage.



WordPerfect's new release offers some impressive features

Format and design

The most interesting innovation in either of these products is Microsoft's AutoFormat. This takes the concept established with Excel 4.0 that certain types of data have standard formats to which they are suited, and that the application, given a style guide, should be capable of applying formatting appropriately to regions of text.

Autoformat is not a panacea. With configuration and patience, however, it has the potential to save time and



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mundane effort. QuickFormatting, or format painting, is less interesting, but more useful, allowing you to copy the format from one text region and paint it onto other areas.

WordPerfect has now added paragraph styles to its previous document and character styles, bringing it on a par with Word, although we prefered Word's style management.

Both have quality document templates, and equivalent template creation tools, although WordPerfect's template feature bar is sweet. Word includes forms like invoices as well as standard document templates, although the 45 ExpressDocs in WordPerfect were more comprehensive.

Microsoft's Wizards tip the format automation scale to Word. This has to be the easiest way yet to create a document — it is literally built for you onscreen, with the Wizard stepping you through a series of questions to determine the style and layout of the document, and largely filling in the format blanks. By the time you commence typing, the document is halffinished.

WordPerfect has a feature similar to Wizards called Coaches. Coaches tend to operate on specific functions, instead of guiding the entire process of document creation, making them more useful as a learning tool than an automation tool.

Both products have easy single-click access to format parametres like character attributes, indentation, justification and bullet insertion, and both have drop-down font and style menus. Beyond style management improvements, such as 'Styles by Example' in WordPerfect, however, format application for each is largely unchanged.

Managing files, particularly in a heterogeneous environment or on a complex network file system, is one area in which WordPerfect leaves Word for Windows looking pathetic.

Word's document management has been improved for 6.0, in particular its treatment of foriegn formats, although the number of filters is minimal. It autosenses formats more accurately, and allows you to work on a document in another format, saving back to that format on the fly.

The File Find management utility is better, too. You can recall files from sets of directories and subdirectories for analysis, and navigation of the results uses a dyanmic tree structure. Pattern matching and boolean searches are supported for text searching, and you can also search by timestamp and view with a Preview, by Summary Info or File statistics. Response time is faster for searches, and also displaying retained files.

There is no comparison to the document management in WordPerfect.

WordPerfect includes a full text search and retrieval indexing system, which indexes files in specified directories in any of the multitude of formats that the program can read, and even those binary formats it can't. The indexing takes some time for large databases (although this can be automated), but once the index has been generated, searches are near-instant. Full boolean searches, and searches on results are supported. Multiple users can share the same indices on a network, and users can access both personal and shared indices.

You also have full file operations — including directory creation and file delete, rename, copy and move — from within standard file dialogue boxes. You can switch from the dialogue to QuickFinder with its text searching, define QuickLists, which allow you to switch instantly between named directory paths, and preview document contents and information. The dialogue is extralarge, and listings are compressed, so you can see more directories and filenames without scrolling.

The range of file formats supported is large, and you can work 'hot' on documents in foriegn formats, saving back to them automatically.

Customisation and ease of use

The macro languages in each product require further analysis. Both are fully tokenised, well documented, and offer developers phenomenal scope.

Word is not quite integrated with Visual Basic the way that Excel is, but its WordBasic in combination with VB and Excel appears to offer unparalleled cross-application automation potential.

WordPerfect makes no such claims, but the product does offer a reasonable chance of retaining DOS-based macros. The simple set that we tried for evaluation worked without problem, although we find it hard to believe that more complex macros will transfer seamlessly.

In both products, you can not only assign macros to icons or keystrokes and re-arrange button or toolbars, but redesign the entire interface, including the menu structure and the interface elements that appear onscreen. Different document templates can evoke completely different interfaces, allowing anyone to create their own operating environments, or even entire workflow systems within their word processor.

In addition to the Wizards and Coaches designed to guide you through more complex tasks, each provides context-sensitive help, WordPerfect for DOS aids, and online tutorials. WordPerfect allows you to save your workspace when you exit, so that when you return all documents and Windows will open as they were.

Conclusion

These packages are complex and powerful. Paradoxically, they set new standards for basic operating intelligence and ease of use.

For a one-stop solution for corporate word processing, check out WordPerfect, with the proviso that you will want at least a 486SX/25 with 8M. Its file management and template features make it a first-class choice for a large network with a commercial load of document processing, with the benefit of Unix, DOS, Mac and OS/2 versions.

Technically, Word is more advanced. Its core editing tools are unsurpassed, and it remains fast and robust on low-end hardware.

Support for OLE 2.0, and tight integration with Excel and Office make it the document container of choice for Windows power users, and a top general-purpose application.

Jeremy White

AT A GLANCE

Microsoft Word 6.0 for Windows

Distributor: Microsoft
Phone: 008 062 062
Price: Unavailable at press time
Requires: 386SX, 4M RAM, 40M hard disk

WordPerfect 6.0 for Windows

Distributor: WordPerfect
Phone: (02) 415 5222
Price: $695, $189 upgrade
Requires: 386SX, 4M RAM, 30M hard disk
In short: If we could take the file management, dynamic interface and utility modules from WordPerfect, and use them with the OLE 2.0 support, cross application macros, automation and tight kernel from Word for Windows, then we'd have a true killer application.



PHOTO: OTTO ROGGE

ETC monitors utilise the latest microprocessor design and digital controls as a standard feature. ETC monitors have mode displays to assist the simple digital controls, making the monitors easy to use and set. The 14" model has 8 LED's whereas the 15" and 17" flat screen models have an LCD panel which displays resolution and each of the 8 controls for your convenience. The latest mode display, developed by ETC, is OSD (On Screen Display) which uses an informative pop-up menu. For the more discerning user there is the Precalour Series that has colour matching and picture tilting capabilities as well as the OSD feature.

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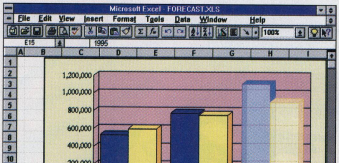
Microsoft Excel 5.0 gets smart

Excel has long been Microsoft's flagship application. Its users have come to expect excellence, and that's generally what Microsoft has delivered. Excel 5.0 continues that noble tradition and represents an evolutionary, rather than revolutionary, step forward. That's good news, because Excel 4.0 was already a good product. However, in embracing technologies like 3D worksheets and advanced data modelling in Version 5.0, Microsoft is only now catching up to competitors like Lotus and Borland.

Excel 5.0 introduces many novel user-friendliness features, which Microsoft it touting as a new kind of spreadsheet 'intelligence', called IntelliSense. IntelliSense, which Microsoft is adding to applications such as Word 6.0 for Windows and PowerPoint 4.0, senses what you want to do, to help make routine and complex tasks easier to automate and complete.

If you type a formula with an open parenthesis and don't add the closing parenthesis, Excel adds it for you. Excel's developers have obviously put a lot of work in adding intelligence to this version. These new properties should make Excel 5.0 easier to learn and use than its predecessor, and that will be an important consideration for any organisation looking to standardise on a spreadsheet program.

But in Today's graphical-interface world, users want more than just new features: they also want consistency and integration among their various applications. More than half of all sales of Excel for Windows are now achieved through sales of Microsoft Office, so it's no wonder that the company beefed up Excel 5.0's ability to share data with other Windows applications, especially other Microsoft applications.



Microsoft's flagship application goes one better

Excel 5.0 has itself become much more standardised. Microsoft changed the menus and dialogue boxes to closely match those in Word 6.0, as well as a future version of PowerPoint that should ship in January. People using these products will see a consistent interface, and the standardisation of features doesn't stop there. A standard macro language (see below), OLE 2.0, and other features are starting to blur the boundaries between Microsoft products.

New ease-of-use features

Users will see a more intuitive multisheet interface in Excel 5.0. Following the lead of Quattro Pro for Windows, Excel displays a tabbed index to its workbook, which happens to be the new default-document type. Not only can you name these page tabs, but you also can move them by dragging and dropping. That's an advantage over Lotus 1-2-3 for Windows' fixed-page structure.

The new workbooks don't just look good. Excel 5.0 represents the first time the product fully embraces the 3D spreadsheet concept. Microsoft has improved the functionality of the 3D workbook over Version 4.0's workaround that used cross-tabulations. The 3D syntax is now simpler, selecting 3D ranges is improved, and, most important, adding many sheets doesn't quickly exhaust Windows resources the way it did in Version 4.0.

Worksheet tabs represent the most obvious improvement in Excel 5.0, but other changes aren't merely cosmetic. For example, Excel 5.0 adds many more wizards for task automation. Another improvement is Tip Wizards, which offer advice on how to better accomplish spreadsheet chores. For example, if you choose Edit-Copy from the menu, a Tip Wizard displays a message saying, "You can use the 'Copy' button on the Standard Toolbar." If you Edit-Copy again, the Tip Wizard offers yet another way to copy data. It keeps track of your work habits and won't bother you with the same advice more than once in the same session.

An even better enhancement is the Function Wizard. Click on its icon in the toolbar, and it gives the ultimate in function-building help. Excel breaks out the function's arguments into text boxes, and the dialogue box shows you the value of the function given the arguments

AT A GLANCE

Excel 5.0

Distributor: Microsoft
Phone: 008 062 062
Price: Unavailable at press time
In short: Packing lots of new bells and whistles, Excel 5.0 for Windows certainly looks good. But new integration capabilities with other Microsoft Windows applications may prove a stronger incentive to upgrade.

S A M S U N G · S A Y S

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17" non-interlaced, Super VGA flicker-free colour monitor

SyncMaster 5Clx
17" Super high resolution, non-interlaced, flicker-free colour monitor

SyncMaster 6C
20" Super high resolution, non-interlaced, flicker-free colour monitor

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MARKETING STUDIES P/L

before you commit the function to the worksheet. This is definitely neat stuff for novices and gurus alike.

Data access and analysis

External data access is one area where Excel has lagged behind the competition. This new version improves matters somewhat by replacing Q+E with the Microsoft Query technology borrowed from Microsoft Access. While this gives you query-by-example friendliness and more data-access options, I still prefer the better-integrated Datalens technology that you get with Lotus 1-2-3.

Excel 5.0 does include a powerful new data-analysis tool, though, called the PivotTable. This is a multidimensional table that lets you manipulate and rearrange views of summary data in a manner that is similar to Lotus' Improv for Windows. While PivotTables are quite potent, they are probably likely to appeal only to power users, because I did not find them particularly intuitive.

Programmability

Of course, there's nothing wrong with appealing to power users, and Microsoft certainly hasn't forgotten them in its drive toward more user-friendliness. The new Excel has some dramatic changes on the high end. The most stunning is the introduction of Visual Basic for Applications as the new macro language. While Excel 5.0 will fully support the old macro language (which many users found arcane), it is, for all practical purposes, now obsolete.

While some macro mavens may lament this fundamental change, most should welcome it. The move to a standard macro language is a great one. Soon, all members of Microsoft Office will share Visual Basic as a common language. Throw in OLE 2.0 automation, and complex cross-application development is suddenly much less troublesome.

New Excel features

- True 3D worsheets.
- In-cell editing.
- Rich text in cells: lets you use more than one type of format on text in a single cell.
- Tool tips: tiny explanatory boxes that ppear below each toolbar button when you pause the mouse pointer over that button.
- Full support for OLE 2.0.
- Tighter integration with other Michrosoft Office applications.
- Custom AutoFill: lets you create your own series, such as business divisions, for AutoFill operations.
- Accounting-underline text styles: conform to accounting standards.
- Trend charts: automatically chart various types of trends.

Excel 5.0 is an exciting product full of improvements, some of which are immediately apparent, and others that are more subtle. Managers who are making buying decisions for whole departments would do well to give Excel 5.0 a good look.

Nicholas John Delonas

Compaq Presario storms in on Mac

Haven't we seen PCs like this before, and haven't we always hated them? Yes, and yes. But Compaq's new all-in-one Presario 425 gives you reason to reconsider the antipathy you may feel toward Mac Classic — like systems that make customisation and upgrading difficult, if not downright impossible.

At 15 by 13.5 by 14.5in (HWD), the Presario is small, taking up no more desk space than a regular monitor, but it isn't wimpy. Inside is a 25MHz 486SX processor, 4M of RAM expandable to 20M, a 200M hard disk, a fax modem (2400bps data/9600bps fax) on the motherboard, and two ISA expansion slots. The built-in 14in monitor has a maximum 1024 by 768 by 16-colour (interlaced) resolution, though 800 by 600 is a better setting.



There are no other monitor options, and you need to keep that in mind.

If you want to get inside to add an expansion card, all you have to do is loosen two screws to pull out a drawer that holds the entire works; it's a fantastic design. While examining the motherboard you'll also spot an upgrade socket for a 33MHz 486DX, 50MHz 486DX, or 66MHz 486DX2 processor.

What you won't see inside is any place to install an internal CD-ROM drive, and that's a serious omission in a system designed to appeal to people looking for a PC for use in the home. Compaq hints that multimedia versions of the system will come along in the future; one hopes they arrive soon and with the best possible components.

Outside you find an on/off switch up front, three monitor controls, a single floppy disk drive, and the usual ports in back, including a game port. And that's it. Setup is as easy as getting the system out of the box and plugging it in. Anyone can be up and running in three minutes.

Software makes it easy

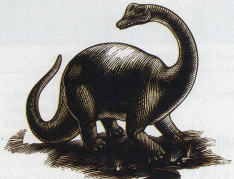
To make the Presario as attractive as possible to new PC users, Compaq has thrown in quite a bundle of software, including a Welcome Centre screen that directs you to any of three different help areas,

AT A GLANCE

Compaq Presario

Distributor: Compaq
Phone: (02) 911 1999
Price: $2500;
In short: A machine that isn't for everyone, but meets the most basic of student and small business computing needs.

INTRODUCING THE ONLY ANTIVIRUS SOFTWARE THAT WON'T BE OBSOLETE BY THE TIME YOU FINISH READING THIS AD.



The Brachiosaurus.
Was it a giant meteor? Global cooling? Who knows what finished this guy off. In any case, he was positively passé by the end of the Mesozoic era.



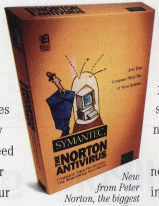
The Ford Edsel.
"Out" even before it was "in." Apparently, the saying that everyone enjoys 15 minutes of fame doesn't apply to the automobile kingdom.



Typical Antivirus Software.
Needs to be updated every month. Useless against the three new viruses coming out each day. Almost as technologically advanced as a Slinky.

It's called Norton AntiVirus™ 3.0 (NAV) for Windows and DOS. It has a brand new Windows interface that makes it easier to use and configure. And it makes other antivirus software look as up-to-date as the leisure suit.

That's because it fights both known viruses and new ones that come out every day. So you don't need to keep raiding your wallet to update your protection, something you'd have to do with other products.



New from Peter Norton, the biggest name in virus protection.

Here's how NAV works. First, it scans your files for known viruses - it recognizes over 2,000 of them. Once discovered, they're automatically eliminated from your system.

Next, NAV takes care of unknown viruses, something that most other software can't do. Using our patent-pending Symantec Novi Virus Sensor Technology, NAV runs rule-based integrity checks to compare current file characteristics with a snapshot stored in RAM before the program is executed. When it notices viral activity, it instantly kills it. NAV also repairs damaged file areas before the virus can complete its dirty work.

For even further protection, NAV alerts you to changes being made to your files — by some anonymous virus, for example. Bad news for even the most clever viral code.

And because NAV scans for viruses faster than any other software, you'll never feel tempted to deactivate the scan to avoid waiting. Plus, you can schedule automatic scans for times when you're not using your computer.

NAV also comes with a network installer* for remote installation, requires very little memory space, and is even available to you in a Netware Loadable Module (NLM) version.

As if all this weren't enough, NAV is both a PC World Best Buy and a PC Magazine Editor's Choice for March '93. So there you have it.

If you'd like more information about the only product that can offer you total, up-to-the-minute antivirus protection, please call **(02) 879 6577.**

For upgrades to Norton AntiVirus 3.0 call **008 810 101.** Then go ahead and put that other antivirus software where it belongs.

Upstairs in the attic with your prized collection of disco records.



*Available only in 10-pack and site license. Norton AntiVirus is a trademark of Symantec Corporation.

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to a setup screen, or straight to Windows. Bundled with the machine are PFS: WindowsWorks 2.0, Windows 3.1, DOS 6.0, and a games package. Run a phone line into the included jack and every member of the family can have his or her own voice mail box. (Though Compaq is proud of its software's ease of use, it should take a look at the long journey through menus you have to take to figure out how to set up voice mailboxes. Easy, it isn't).

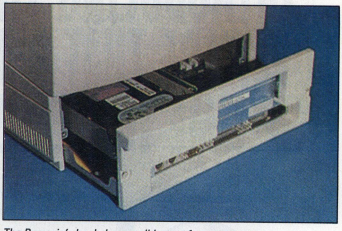
The Presario is also a low-power Energy Star-compliant system. Two utilities easily accessible in the 'Compaq Control Centre' let you set shutdown intervals for both the monitor and hard disk. Powering back up is just about instantaneous.

Benchmarks

In benchmark testing, the Presario was above average compared with other 25MHz 486SX systems in all categories except one: video. To keep the cost of the system down, there's no local-bus video implementation, and no Compaq QVision either. Video performance is below average for systems in this class, but it's not a fatal flaw.

In fact, the biggest complaint to make about the Presario's otherwise excellent design is an ergonomic one: the system is so small it can seem a little low on the desktop, forcing you to look down at the screen rather than straight at it. Some users will probably want to put a couple of telephone books underneath it for maximum viewing comfort.

This system replaces nothing in Compaq's ProLinea line; all the ProLinea systems still exist. And like all of Compaq's systems, the Presario machine comes with a three-year warranty.



The Presario's back drawer slides out for easy access

Mass market

By introducing the Presario at a time when it didn't have to dumb down the system to achieve a mass-market pricepoint, Compaq has succeeded where other vendors chasing after the Mac have failed. With no monitor options and such limited expandability, the Presario obviously isn't for everyone; but students, people with small home businesses, or anyone with no space to spare should take a look.

Don Willmott

New BallPoint gives better feel, better software

The $199 Microsoft BallPoint Mouse, Version 2.0, is a huge improvement over the original. Its design is much more comfortable, the trackball is easy to control, the serial connector is gone, and the software includes a variety of smart utilities. But with built-in pointing devices — especially front-and-centre trackballs — popping up on more and more notebook PCs, you have to wonder, is the new BallPoint Mouse dead on arrival?

The answer is no. The control you get with the new ergonomically designed BallPoint is far superior to that of most built-in trackballs. Two mouse buttons run almost the entire length of either side and are sculpted to fit your finger. If you happen to love front-and-centre designs, a third button forms a semicircle around the trackball, making it easy to point and click with just your thumb. The BallPoint Mouse's trackball itself is heavier, smoother, and more resistant than before to give you better control over the cursor.

The serial adaptor has been replaced by a PS/2 adaptor, so you never have to chose between giving up your serial port and attaching an extra serial-to-PS/2 adaptor. The mounting device is designed to attach to your notebook's keyboard and never come off. Now when you pack up your notebook, you can simply snap off the BallPoint Mouse, leaving the attachment clip in place (it adds less than an inch to the notebook's width), and close the case. Be warned, though: the BallPoint is so securely attached to its mounting device that snapping it off can feel more like breaking it.

Version 9.01 of the BallPoint software includes new utilities that make it easier to use your cursor on LCD screens. Snap-to makes the cursor jump to the default button when you open a dialogue box; when you've lost sight of the cursor, Locate helps you by placing it in the centre of the screen; and Screen Wrap makes the cursor go to the opposite side of the screen when you move it off one side.

Mouse trails can be enabled, but only with standard Windows EGA, VGA, or Super VGA drivers, and the cursor can be made to appear in three sizes and three colours. There's even a Magnify option that turns the cursor into a magnifying glass for reading hard-to-see parts of the screen. Users of the original BallPoint can upgrade to the new software for $45.

Brad Grimes

AT A GLANCE

Microsoft BallPoint Mouse, Version 2.0

Distributor: Microsoft
Phone: (02) 870 2100
Price: $199: upgrade $45
In short: Worth the upgrade, the superior design of this new mouse results in hard to beat cursor control.

What makes INEX® Series Notebook computers so incredibly special?

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Cache memory	Internal 8KB
I/O	PCMCIA/Built in trackball/EXP. AT bus slot/ps/2 Mouse port/PC audio/External VGA monitor/1Ext. keyboard port/ 1 serial/1 parallel
Dimension	284X226X41(4500)/284X226X45(4550)
Weight	Under 2.25kg 4500/2.6kg 4550
Power	100/240 VAC switchable, 50/60Hz autosensor, NiMH battery with up to 4 hours use

INEX® 4100 (486SLC)

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Coprocessor	Optional socket
Memory	4MB on board(EXP to 8MB)
Storage	80/130/200/245/345Mb HDD 3.5"1.44MB floppy disk drive
Display	10" wide screen, CCFT backlite LCD 640X480 resolution 64 gray scale
I/O	Exp. bus slot/External VGA monitor/ Ps/2Mouse port/1Ext. keyboard port/ 1 serial/1 parallel
Dimension	287X225X45(mm)
Weight	Under 2.60kg with battery
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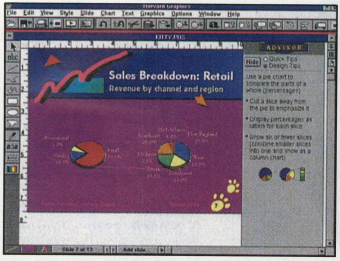
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All business: Harvard Graphics for Windows 2.0



Harvard Graphics for Windows 2.0 is user-friendly, but slow

I have to be honest; I sometimes make snap decisions. When I first saw the Harvard Graphics for Windows 2.0 (HGW2) box, I decided I liked the look of the product. The box is the right size, easy to get into, cleanly designed and informative without being flashy or having the latest graphic designer nightmare drips spattered all over the outside. Bit like the program itself, really.

Opening the box reveals a disk packet with 10 3.5in floppies inside, a *Using Harvard Graphics Guide* and a small booklet detailling the use of Harvard F/X. This is a bundled standalone graphics and effects package that links into HGW2 to give added zing to text and images. Also thrown in for free are an HGW2 runtime player, and Autographix, a modem-based automatic slide production service.

Loading all those disks does take some time, and the end result is 11.5M of your hard disk disappearing under HGW2 code and symbols (The authors, SPC, obviously don't like calling it clip art). This can go up to 21M if all art, tutorials and extras are loaded. The specified minimum configuration is a 386 with at least 4M of RAM, and preferably MPC support too.

When you open HGW2, you are given the option to either open a presentation, or start a new one. First-time users are invited to check out the five-minute coach which gives a quick tour through the capabilities of the package. The problem is, the one drawback with HGW2 is that it is not quick.

Although for presentations, speed of loading is not a big issue — the graphics speed of the presenting PC is more important — this program uses so much disk access that the light barely goes off. It took over 45 seconds to load the program itself on a well-cached 486/25, over a minute to load a 30-slide presentation, and over 20 seconds to uncouple itself from Windows. That is definitely not quick.

Okay, so a fast hard disk is absolutely essential for this software. What else? Apart from the normal Outliner, Slides and Sorter options, HGW2 does have some useful add-ons. As you put together your presentation, you can call on the help of the built-in Advisor to give you tips and previews on various styles and methods of screen enhancement. This works a bit like Symantec's DAVE and Microsoft's Wizards to help out with the overall look of the end result.

The mouse can be used to edit any section of your screen on the fly. Clicking the right mouse button puts you in QuickChange mode, and a double click gives QuickEdit. This saves going all through the menu structure to make subtle alterations using the toolbar or menu. You can work on any of the 30-or-so predesigned master sets of slides and simply click and fill in the details as you want, or you can build your own sequence from scratch using a Master slide format to ensure a reasonably coherent production.

Linking a presentation show to other activities is well supported. OLE capability means video and sound can be ported in, or you can use the integrated Video Player to put the movie screen where and what size you want it on screen. If you want to you can run a single presentation across a network using the Conferencing option.

In comparison to my favourite package, Freelance Graphics, HGW2 is probably slightly ahead of the game in features and online help, but takes one step back thanks to all the disk business. Snap decisions aren't always to be trusted. I still like the box, though.

Jeremy Torr

AT A GLANCE

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IBM

Market share doesn't equal technical brilliance

I acted as the moderator for a session on object-oriented languages at the recent Object World conference and exhibition in Sydney.

I felt something of a fraud, for my experience with languages just about made it to C SmallTalk and C++. Interestingly more of the people in the audience used C++ than used SmallTalk. Yet the experts seemed to agree that SmallTalk is actually a better language.

Of course, technical superiority has never been an important criteria for the success of any computer product. Provided a product does the job, technical superiority counts for far less than market acceptance. There are plenty of superior products that have sunk without a trace simply because they could not build a market for themselves.



BY JEREMY HOREY

While it would appear that NeXTStep is the most favoured tool for developers, it certainly doesn't have a share of the market that is necessary to keep it alive.

but certainly didn't get anywhere near C++. I have looked at the Windows development tool, Actor, but I was a long way from doing anything useful.

Anyway, the session was very interesting. It came, in the end, down to a discussion about the relative benefits of

Lotus Agenda is a perfect example of this. This was a great product and some people were even enthusiastic enough to start up companies to provide third-party products to work with and within Agenda. In many ways, Agenda was ahead of its time technically, but without market acceptance it was a dead duck.

Certainly, the case with SmallTalk and C++ is different. Both have reasonable followings, although SmallTalk supporters remain in the minority. C++ has its problems in standardisation, but still, if anyone thinks of object-oriented programming, they think of C++ first.

On top of that, it is supposed to be relatively easy to move from C to C++. This may or may not be true, but it is certainly something that attracts many to C++. C programmers looking to make the move to the flavour of the year in programming take C++ as the path of least resistance.

There was a lone advocate for the NeXTStep development environment on the panel at ObjectWorld. He worked with the operating system at Data General. Nobody else seemed to have any familiarity with (and few seemed to have any interest in) the NeXTStep system.

However, NeXTStep has attracted a lot of developers. Indeed it has attracted developers in numbers out of all proportion to the number of copies of the operating system that have been sold.

As a development environment, it has a tremendous reputation. Developers speak of it with real affection. Indeed, their attachment goes beyond any enthusiasm that I have seen before.

My conclusion from all these observations is that NeXTStep is technically superior to any other operating system on the market for developers. Clearly this has not translated into sales volumes.

Also clearly, there are going to be a few people who will buy NeXTStep because there is some great application that they *must* have that only runs on this operating system. However, I suspect that by the time NT is fully object oriented and Pink is on the market, NeXTStep will have simply disappeared.

Again I suspect that neither the object-oriented NT nor Pink will be as attractive to developers as NeXTStep. However, Microsoft and IBM/Apple have the marketing muscle to push their operating systems into the market in reasonable numbers. This alone will ensure that canny developers will choose these operating systems over NeXTStep.

Sadly, it is an old story in the computer business: success depends on market share and not on technical brilliance.



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COGNOS

PROVEN IN REALITY

Computer censorship truths

In early September the computer industry witnessed a debate on the mutually exclusive and equally insidious evils of computer-based porn versus the threat of control over freedom of expression, whether in words or images.

The real issue, however, of whether material that depicts acts of violence or explicit sexuality which is computer-based should be treated in the same way as material on any other medium, was not fully addressed.

Blame the carpenter, not the tools. Four of the six debaters had only passing knowledge of the computer industry, so indeed we should hardly have expected them to debate the point set down for discussion. Rather then, what we heard was a treatise on the ills of censorship, the questionable rights of a bureaucracy out of touch to decide what we should play, equating that with what we should do, making the inevitable quantum leap to control over what we should think. Counter assertions were that such material perpetuates the incidence of acts of violence against women, and that it is in itself neither positive nor constructive and in plain, distasteful to many. Fair comment, from both sides of the floor.

It is absurd to say that although we accept the transition to the small screen of other forms of expression such as writing, drawing and online access to information, recreational materials such as games should be prevented from coming out of the video parlour and into the lounge room. Nevertheless, the improved screen resolution available on even moderately priced PCs and the interactive nature of computer-based games demands that we treat the new genre in a different light, and not seek to impose the same rules for media we understand upon a medium which we have only just begun to explore. Traditional censorship is not only difficult to impose in a computer-based environment, it is impossible to enforce.

Market forces reinforce that self regulation is a joke. Several software dealers *APC* contacted after the debate admitted freely that if it comes into the store, it goes on the shelf. The only reason for a product to be taken down is if it doesn't sell. Many violent and gory games don't sell, apparently, but resellers have taken the firm stance that it is not their role to be arbiters of public taste or morality, and business is business.

Ironically, many small 'l' liberal freedom of expression advocates support the concept of gun control on the basis that the fewer loonies around with access to dangerous weapons, the safer the streets will be at night. Ideas, as even those outside the publishing world will testify, are powerful and persuasive weapons, and repeated exposure to any sound or image will cause a natural desensitisation — try living along a railway line and you'll see what I mean. So if it follows that limiting access to powerful and potentially dangerous ideas will lessen the frequency of violence, to *anybody*, not only to women, then there's a strong argument in its favour.

But the attitude which currently prevails smacks of the paradoxical approach to the control of 'soft' drugs in this country: that in some states while it is perfectly legal to display a bong on a shelf in a shop it is not legal to buy one, it is an offence to be heard describing its use, and certainly illegal to use one. At the production end of the food chain, it seems unavoidable, all too difficult. The purchaser is visible, ipso facto retribution must fall on him. It's the playing we're encouraged to believe is a depravity that should be stopped, for the greater good of society. No discussion has been heard about the rights or motivations of those who write, distribute and sell such violent or sexually explicit material. If it's criminal or obscene to want to play such games, how much more pernicious to profit from the aberrations in the mind of the player.

Margaret Bateman raised the important point that more information, rather than less, will redress the imbalance which currently exists, and which causes people to be characterised and stereotyped. Censorship which restricts information flow will never encourage new behaviours; rather, it signposts those aspects which a society considers are not acceptable.

The Hon Marlene Goldsmith MLA is adamant that another person's rights stop at her nose, that her rights to be protected are equally important as the rights of an antisocial individual to play and glean ideas from violent or explicit games. While I almost agree, I also acknowledge that neither she nor I, nor any other person or institution has the right to decide who those people might be.



HELEN DANCER

The controversy over censorship of computer games has sparked extensive debate within the industry that has spilled over from being just about the computer platform.

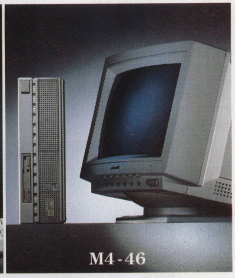
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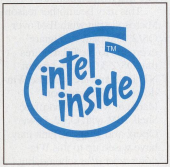
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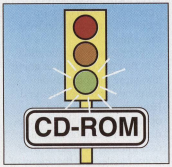




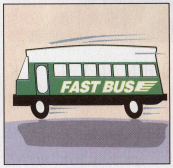




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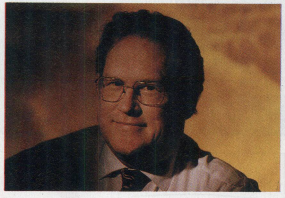
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Windows NT: Workstation killer



BY JOHN DVORAK

Aha! Suddenly it's obvious why Microsoft is pushing Windows NT.

There is so much controversy over Windows NT that it seems the real purpose and intent of the product has been lost in the analysis. NT was created for the sole purpose of destroying the market for workstations and strengthening the position of the PC.

Hear me out on this one.

I think everyone has been somewhat mystified about NT and its reason for existence. Microsoft makes all its money selling desktop-computing operating systems and applications that run under the ever-changing DOS/Windows environment, as well as applications for the Mac and OS/2. What's the point of NT — the portable version of OS/2? Remember, it had been called OS/2 3.0. Why would Microsoft bail out of the general-purpose Intel-based OS/2 (where the action is) and stick with this odd 'portable' product?

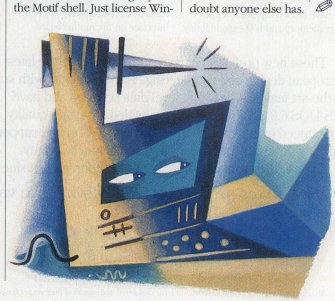
Well, Microsoft has analysed the workstation business, including the buiness of Sun Microsystems — a company that has taunted Bill Gates over the years. Microsoft sees the obvious: the workstation business follows the same modus operandi from company to company, and the M.O. is not much different from that of the archaic minicomputer business of years gone by. All that has changed is the phraseology. You have an expensive machine that uses a proprietary CPU and a proprietary operating system. Today's workstation marketeers have tried to convince the world that they do not use proprietary chips or operating systems. After all, anyone can use a SPARC chip, and the MIPS chip is for sale, isn't it? And Sun loves to talk about how 'open' its system is. Finally, they all point to the fact that they use Unix. What could be more 'open' and non-proprietary than Unix?

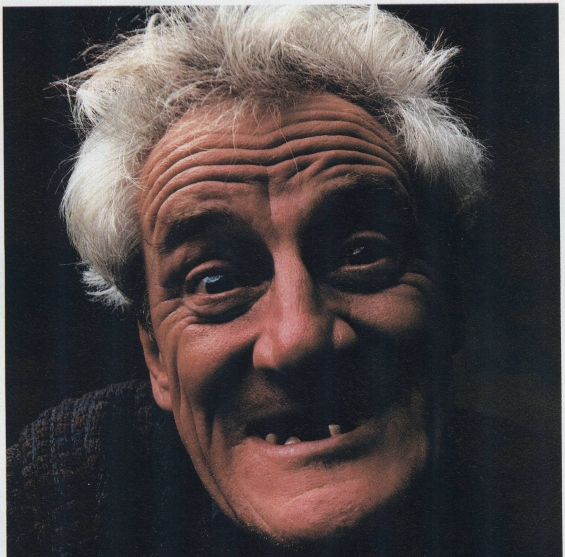
A closer look reveals all this to be total bull. In fact, the various sytems *are* proprietary. Only Sun uses the SPARC chip to any commercial degree. And the Sun version of Unix is hardly universal. Silicon Graphics uses the MIPS chip and its own version of Unix. DEC uses the Alpha chip and VMS or Unix. Name a minicomputer — oops, I mean workstation — and you'll find a de facto proprietary chip and a modified version of Unix that is hardly standard fare. And the only reason that any of these guys use Unix is because Unix gives them a head start on operating system development. Who needs to reinvent the wheel?

Enter Microsoft. Microsoft sees that this basic Unix going into these machines is old-fashioned and unchallenged. How about developing an operating system that is superior to Unix and offers a nice user interface? Forget X Windows hassles and the agony of the Motif shell. Just license Windows NT and you get it all. And golly, Microsoft will even help you get it running on your hardware, Mr Workstation Man!

Therein lies the rub. What happens when the suckers in the workstation business put Windows NT on their machines? They suddenly become familiar with the Windows look and feel and begin to compare the workstation to the PC. Hey, now they *really* look the same. And guess what? The performance of the cheap desktop PC is not that far behind that of the expensive workstation. In fact, it might be better for the PC if the workstation is bogged down by NT. All the PC needs is a big screen to look exactly like the workstation, too.

This may be another reason Microsoft split with IBM over OS/2. The plan to migrate everyone to the PC requires that OS/2 3.0 (oops, I mean NT) look and feel just like Windows, not Presentation Manager with its Workplace Shell. IBM with OS/2, PowerOpen, and Taligent/Pink may have wised up to this Windows *uber alles* scheme, but I doubt anyone else has.





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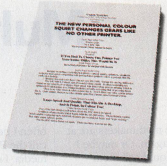
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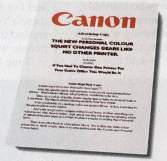
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Multimedia myths, shattered

The mythmakers are at it again. Or maybe I should call them naysayers, or a lot worse. These are the same people who assured you, for example, that desktop publishing was 'only a technique, not an application' — and that clearly there'd never be any such thing as the desktop publishing market. Now these people are hacking away at the notion of a market for multimedia.

Good thing we never asked them about the internal combustion engine. Or colour TV. Or PCs themselves, for that matter.

I've noticed lately how often I hear what I've come to call the Four Big Lies of Multimedia. I run into this nonsense again and again, often repeated in the same words, and I've started to wonder: is there a Typhoid Mary running around the country, infecting people with this bushwa?

Time for some debunking.



BY JIM SEYMOUR

Who says multimedia's not a market? The public has spoken, and the industry's naysayers are wrong.

Big lie number one:
Don't be fooled by all those people buying sound cards and CD-ROM drives. That isn't a multimedia market in the making; it's just a lot of impulse buying.

Huh? What does that mean? If 'a market' means a technology or group of technologies, embodied in products that are hot sellers now and for the foreseeable future — and these products seem likely to be incorporated into what we think of as mainstream PCs themselves — then how can anyone claim there isn't a real multimedia market yet?

Take a stroll around the nearest Computer Spot, Harvey Norman, Pacific Microlabs, or other big computer retailer or superstore some Saturday morning. Look at what people are buying, what they're arguing with each other about. It's CD-ROMs and sound boards — often bundled together. The people have spoken, and multimedia is what they want.

Look, too, at the kinds of computers the mainstream PC makers are bringing out. Ted Waitt at Gateway 200 started the trend of putting CD-ROMs in almost every machine a company ships; now Apple and other PC makers are doing it, too. And the ones that don't bundle CD-ROM drives with new systems make them such cheap add-ons that they're nearly irresistible.

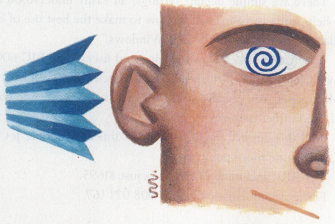
Seymour's law of PC buying for Spring 1993: Buying a desktop PC without a built-in CD-ROM drive is a big mistake you'll soon regret.

What's happening out there, despite the naysayers' grumblings, is the birth of a real and continuing market. The single most critical element in establishing that market is well under way today: building the installed base of multimedia-capable PCs.

Big lie number two:
This stuff's too hard for most people to do themselves. They won't use multimedia authoring programs to make their own animated slide shows and video and sound-clipped presentations themselves.

Yes! Exactly! Did anyone think otherwise?

That's just the point, in fact. The hottest corner of the



JIM SEYMOUR
Continued from page 54

PC business now goes by the clumsy name of *content publishing*. Not selling tools with which to manipulate data (in other words, *programs*), but selling the data itself (namely, multimedia CD-ROMs). Indeed, the multimedia CD-ROM publishing business is one of the biggest opportunities created by the personal computer. It's a whopper of a chance for creative types, marketers and PC resellers. The only question is whether we'll see new fortunes made or whether a cabal of existing PC companies, such as Microsoft, and some of the old-line Hollywood entertainment producers, like Time Warner, rush in and gobble up the big bucks.

Of course, for mass-market CD-ROMs to really take off, we need a big installed base of multimedia PCs in place to provide the volume needed to drive the market. In other words, there's synergy at work here. In the chicken-and-egg relationship between multimedia hardware and software, the boom on each side drives the other.

Big lie number three: *Even if you want to create your own multimedia programs, it's just too hard. You'll look silly.*

C'mon guys; you can't have it both ways. Rather, there are a couple of possibilities: either we won't roll our own and will make multimedia publishers rich, or we *will* make our own and will make the multimedia applications-software people rich.

In fact, we'll do both. You don't need an all-singing, all-dancing production, in the words of the old musical movie-makers. It's perfectly legitimate to add some voice-over, maybe a few sound clips, and a little music to give some pizzazz to an otherwise flat, silent PC-based slide show.

If it's a selling job — and virtually every presentation *is* a selling job, whether you're trying to persuade people to give you an order, fund your school's programme, approve your division's budget, or vote for your bill — then multimedia's extra zip can move your audience to agreement and action.

Finally, big lie number four: *Nobody really cares about this stuff.*

No? Watch your kids' eyes light up when dinosaurs roar into action — *literally* roar, even if only over your PC's internal speaker.

Watch your spouse perk up when you plug Microsoft's Cinemania or Musical Instruments into your CD-ROM drive.

Watch your boss and the rest of the budget committee sit up and listen as you hit the third or fourth slide in a presentation using voice clips.



PC multimedia is real. It has many forms. It runs on a million personal computers today and will run on several million more by the end of the year. Hundreds of thousands of people use it every day in business, schools, and in their homes. It's affordable; it's persuasive; it makes sense.

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We welcome comments and suggestions. Send correspondence to APC Readers' Say, PO Box 37, Sydney, 2001; or by email to 5653911@MCIMail.com. All correspondence becomes the property of APC and is subject to editing.

Readers' say

Warranty woes

Are computer and accessories distributors' warranties worth the paper they are written on? Here are some of these so-called warranties.

First example: One 386SX laptop (KT Technology) was sent to the Melbourne distributor in January 1993. The laptop was finally returned in October 1993 after many phone calls. At one stage it was traced to the Sydney branch and then it disappeared for about three months, eventually turning up in Melbourne. The eventual repairs were sent in to be fixed, but because the warranty ran out while waiting for the item to be returned, we were charged for the repairs.

Second example: A simple matter of repairs to an automatic printer sharer, or so I thought. This item has been away for four months now, and according to follow-up enquiries the sharer has been sent back to Taiwan for repairs. This was a brand new item and didn't work at all from the beginning. One would have thought replacement would have been statutory.



As of writing this letter the sharer has not been returned and there is no sign of this happening in the near future. This delay has cost my company a possible tender and a customer, as I found out later. Had I known the outcome sooner, I would have replaced the item myself.

Third example: This is also a laptop (Edge Technology). I had only had my machine for six weeks and the hard drive had to be replaced, which only took a month from dispatch to receiving it back again. But within three weeks the hard drive again developed faults. It was sent back in July, and now it is October and there's still no sign of it being returned, even after many phone calls and threats of legal action.

Being a computer consultant and supplier, these so-called warranties cost my company money by having to cover manufacturers' and distributors' warranties to keep my customers happy, which is my company policy. But it shouldn't have to happen if instead of spending thousands of dollars on advertising in magazines such as yours, these companies channelled some of this money into decent warranty service.

These are not isolated cases that I have mentioned; being a TAFE tutor, my students also tell of similar problems. I hope this letter brings some response from other dissatisfied consumers and gives these people the message that without us they don't have any business.

Kevin Kersbaw
Kersbaw Enterprises
Mackay, Qld

Questions on Service and Reliability survey

We recently commissioned a report from Dr Aidan Sud-

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Pocket Ethernet Adapter

- uses parallel port on Notebook/PC
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- 1 BNC port

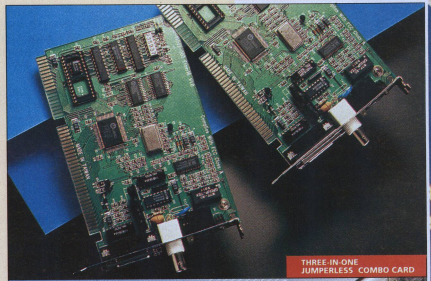
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Newgen printer win for subscriber



You will recall that *APC* ran a subscription campaign/promotion in the April, May and June issues this year. The prize was a Newgen PS 880P printer valued at over $6300. The winner was Anthony Kemp, of Perspective Technology, 4 Windward Loop, Ocean Reef, Perth, WA.

The printer was presented to Mr Kemp at J. Mills Pty Ltd, in Balcatta, WA, by Mr Alan Duncan, the Director of J. Mills Distribution. Mr Kemp is pictured here with Mr Duncan; Mr Kemp is on the left.

bury, Dept of Mathematics, Monash University, in Clayton, Victoria, into the validity of the Service and Reliability survey which appeared in the July issue.

This report is a follow-up to a more detailed report that was conducted by Dr Clark, on the Service and Reliability Survey survey published last year. The conclusions of the enclosed report again verify our concerns about the accuracy of such surveys and as such have prompted this response.

Some points to be addressed as a result of this survey include:

"As pointed out by Dr Clark in his (previous) report, the chief problem with such surveys is that they are inherently biased. No-one could plausibly claim that a small self-selected sample of magazine readers forms a fair representation of computer users."

The report goes further to comment that the rationale explained under Methodology does not go far enough, and in fact should include explanations along the following:

". . . it may well be that the people most likely to respond are those who have had difficulties with their PC, thus inflating the number of complaints. It would not be surprising if the general reliability and service were better than would appear from this survey."

The small sample size used has also been criticised as follows:

"Figure 1 gives a rough guide to when differences from the average should be considered as being potentially due to sampling error, and when they might be considered significant."

"For instance, under Commodore, it is stated that 75 per cent is considerably higher than the overall average 66.9 per cent. With a sample of 50 it can be seen that this is not a reasonable statement."

Bearing this in mind, loaded terms such as 'well below' or 'well above' should be replaced with more accurate descriptions. It is not sufficient to remind readers that "strict statistical tests do not apply" without explaining the distorted effect this has on the overall interpretation of the survey.

In conclusion, the report states:

"No doubt such surveys do help to keep manufacturers on their toes. What, therefore, is vital, is that those who run surveys of this kind forcibly remind their readers that the survey is not a random sample, may well not be representative of PC users in general, and is liable to substantial sampling error when the number of responses is low."

We believe that it is irresponsible to publish results that are open to misinterpretation or are based on dubious methodologies, especially when such surveys are widely distributed and influence the buying decision for a large number of PC users. It would be our contention, therefore, that unless a truly random survey of a significant number can be undertaken, then it should not be conducted at all.

Therese Santon,
Sales & Marketing
Co-ordinator
All Data Australia

No other publisher or research house was (at the time of our survey) attempting to measure the level of after-sales support offered to Australian PC *users.*

All Data (or Arrow) PCs have been featured in our Service and Reliability survey since its inception in 1991. Perhaps the most important indicator measured by the survey is the proportion of users who said they would purchase from the same manufacturer again. The scores for All Data are as follows:

1991	*66.7%*
1992	*76.5%*
1993	*82.9%*

Rather than focus on this improvement in performance All Data has, for reasons best known to itself, chosen to commission a report attempting to discredit the research done by APC. *While we would be the first to admit that our methodology is not perfect, we would like to point out:*

No other publisher or research house was (at the time of our survey) attempting to measure the level of after-sales support offered to Australian PC users. At least APC *is attempting to get some comparative measure of service (and at considerable financial risk) to inform our readers.*

We are always open to comment or suggestions on improvements to the survey or methodology. To date, there has been ***no*** *positive input from the Australian PC industry despite the fact that numerous vendors use the survey results as a sales tool.*

To deal with the specific points mentioned in the letter above:

On the first page of the write-up of this year's Service and Reliability survey we clearly state, "Our sample is not a perfect random representative sample of the installed base and therefore results are not, necessarily,

Figure 1

eg: No. of Replies	Ignore % difference less than this figure	% difference above this figure may be significant
30	9%	18%
50	7%	14%
100	5%	10%
200	3.5%	7%

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The right connection for quick and easy scanning. No internal interface card needed. Just plug the Prinscan interface into your computer's parallel port. Now, you can capture image excellence with ease. Produce high quality images for use in graphic design, presentation, DTP, OCR image database and more.

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projectable to all PC users." We feel this statement together with the remaining content of the write-up is adequate warning of the sampling errors. In fact, it closely resembles Dr Sudbury's own statement in the conclusion of his report.

Having said this, it is difficult to accept Dr Sudbury's suggested addition to the methodology (fifth paragraph of the above letter). If the suggestion is true, how can Osborne users (sample size 266) rate access to product support at 8.6 (0.7 above All Data) and the product support they received at 8.4 (1.4 above All Data)? Is Dr Sudbury suggesting that the users of All Data products are more likely to participate in the survey ONLY if they are dissatisfied with their after-sales service?

Perhaps Dr Sudbury means the users of any product who achieve scores below average are more likely to participate in such a survey. Is there any empirical evidence to support Dr Sudbury's claim?

Having questioned the validity of the sample, Dr Sudbury then suggests the survey results should include a cut-down version of a standard deviation table. Given the unpredictable nature of the sample alleged by Dr Sudbury, such a table would seem of little value to readers. In any event, surveys published in the mainstream media (such as the AGB McNair survey published in The Bulletin) rarely (if ever) include a standard deviation table. In general, as with our published results, survey write-ups give a rough guide to where differences may be significant.

In his detailed report, Dr Sudbury suggests, "it would not be difficult to provide error bars for each score on each chart". APC would be more than willing to publish results using this format if All Data would supply one provided it is meaningful to the majority of readers. Each of the twenty-odd vendors included in each chart has a different level of response.

In his report, Dr Aidan Sudbury recommends that All Data should conduct its own survey, to establish if the results from the Service and Reliability survey represent an accurate impression of the reliability of All Data products and the after-sales service offered by the company.

APC would be delighted to participate in such a survey using an independent mailing house and a large random sample of All Data clients (drawn from All Data's records by an independent arbitrator). APC would supply questionnaire design, data processing and analysis free of charge. In addition, we would be happy to have our analysis audited if required.

Regular readers will be familiar with the results of the survey over the past three years. APC would relish the opportunity to validate (or otherwise) the results of our research.

We look forward to All Data's participation in this validation exercise. APC aims to provide readers with information to assist them in their PC purchasing decisions; the Service and Reliability survey is part of that service. In our business it would be a much easier job to keep quiet, keep all the vendors happy and increase our advertising revenue. However, APC is the biggest selling computer title in Australia because we put our readers' interests first. We will not abandon this philosophy.

Apology to Mr Mike Boulos

In an article in the August edition of *Australian Personal Computer* under the heading 'New Franchise Owner for ComputerLand', it was stated that the franchise structure of ComputerLand "has repeatedly collapsed — once under the charismatic Mike Boulos, then again under Computer Australia and most recently under HiSoft when that company failed."

The suggestion that Mr Boulos was responsible for a collapse of the ComputerLand franchise structure was false and without foundation. Mr Boulos was a managing director of ComputerLand Australia and ComputerLand Solutions until the latter part of 1989. Mr Boulos was involved only in those Australian companies and in March 1990 his involvement ceased. It was not until some time later that the companies called Computer Australia and HiSoft, which was involved in the franchise operation, went into liquidation.

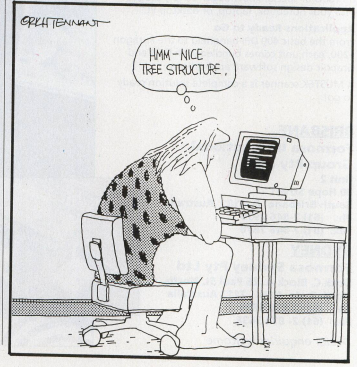
Australian Personal Computer accepts that while Mr Boulos was a managing director of ComputerLand Australia and ComputerLand Solutions, he carried out his duties with complete competence and *APC* apologises to him for any distress or embarrassment that he has suffered as a result of the publication of the article in question.

Win a colour Toshiba notebook

APC and Toshiba are pleased to be able to offer you the chance to win a state-of-the-art, colour active-matrix notebook computer. In addition, in entering the competition, you will be having your say in the editorial policy of *APC*.

With this issue you will find a questionnaire loosely inserted. We have designed a survey to obtain detailed information about computers, what you do with them and how you use them. Our primary objective is to tailor *APC* to meet your ever-changing requirements to ensure that the magazine remains Australia's best-selling computer title. Together with our annual Service and Reliability report, this survey is the most important research we undertake; please participate in it.

Make sure we have details of your experience to help us plan next year's *APC* and give yourself a chance to win this fabulous prize. Simply take five minutes to complete and return the questionnaire to us — you don't even need an envelope or stamp!



INTRODUCING THE FASTEST WINDOWS WORKSTATION COMMON SENSE CAN BUY



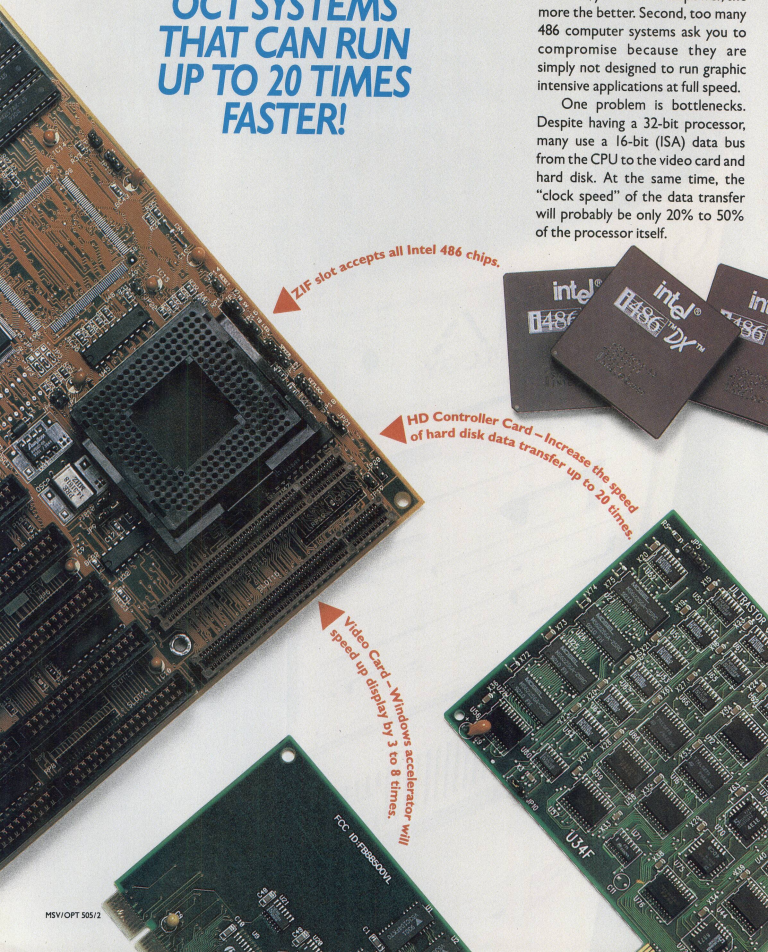
MSV-OPT 305/1

OCT SYSTEMS THAT CAN RUN UP TO 20 TIMES FASTER!

If you use Windows, you have probably learned two simple truths.

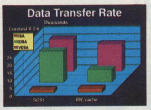
First, you need horsepower, the more the better. Second, too many 486 computer systems ask you to compromise because they are simply not designed to run graphic intensive applications at full speed.

One problem is bottlenecks. Despite having a 32-bit processor, many use a 16-bit (ISA) data bus from the CPU to the video card and hard disk. At the same time, the "clock speed" of the data transfer will probably be only 20% to 50% of the processor itself.



MSV/OPT 505/2

The other problem is display. Most standard video cards, even super VGA, do not have independent graphic acceleration. As a result they rely on the CPU. This drains resources, and backs up more data at the bottlenecks.



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All systems come with 4Mb of RAM, expandable to 32 Mb, and all but the 486SX system come with a 256k memory cache as standard.

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Or, if your work includes CAD or complex graphics, you might prefer either other third party high-end VESA cards, or our soon to be released dual hard disk/screen controller card.

Motherboards come with a continually upgradeable ZIF (zero insertion force) CPU slot as standard, that accepts every current Intel chip from 486SX to a 486DX2-66, and even Pentium overdrive chips as they become available. The CPU is supported by a Dallas battery with life time warranty as well as an automatic configuring BIOS. We offer almost every conceivable case, screen and hard disk option, along with floppy and tape drives, CD-ROMs and magneto optical disks.

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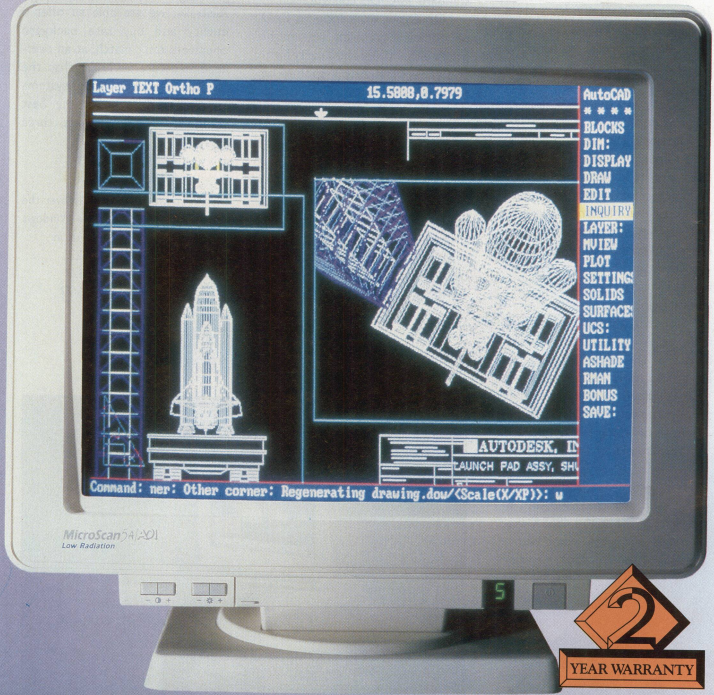
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After sales of our MicroScan series topped a million, we knew we'd hit on a good idea.

PC MAGAZINE EDITORS' CHOICE

But, in the fast-moving colour monitor market, you don't just need last year's best seller. You need this year's too. And that's why our 120 R&D staff got their heads together and came up with the next generation MicroScan series. Already it has received the **"Editors' Choice" award from PC Magazine,** (March 16, 1993). It's got all the usual hot-selling features and more ...

- ❑ TCO approval (optional)
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- ❑ Picture geometry and color adjustments



The MicroScan 3E+ – winner of the "Editors' Choice" awarded in PC Magazine, March 16, 1993

And of course, the second generation continues the ADI commitment to offer a full range of microprocessor controlled monitors. With the added intelligence microprocessors bring, ADI monitors provide a wide range of signal compatibility. Giving you and your customers more flexibility for your money.

Now is your chance to join up with the first company in Taiwan to produce IBM compatible 14" monitors – the first to offer a full range of microprocessor controlled multi-frequency monitors. And a company that always puts you first.

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Model	CRT size	Dot Pitch	H-Freq.	Max. Res.
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MicroScan 3G	14"	0.28mm	30-57KHz	1024 x 768(NI)
MicroScan 4G	15"	0.28mm	30-64KHz	1280 x 1024
MicroScan 5A	17"	0.26mm	30-64KHz	1280 x 1024

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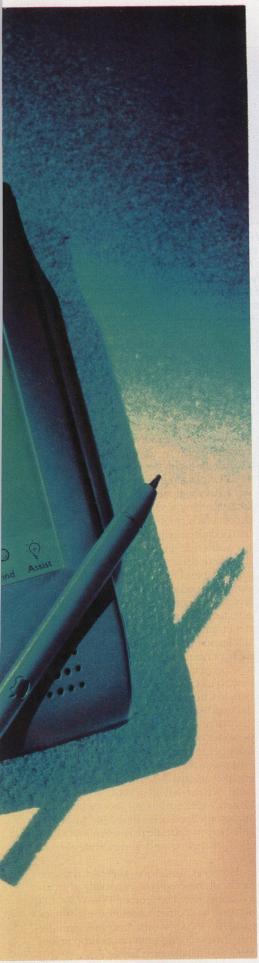
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Photograpy by Dennis Blachut



Are PDAs ready for prime time?

BY TOM R. HALFHILL

Technically impressive, Apple's Newton MessagePad and the Tandy/Casio Zoomer are the first true Personal Digital Assistants. Their potential is tantalising, but the reality leaves something to be desired. Prices are high, handwriting recognition marginal, and communications are incomplete. Yet with the technology advances, PDAs may yet fulfill their original vision.

The first personal computers all looked the same: a box with a video screen and a keyboard. Beneath the surface, however, were significant differences in terms of microprocessors, operating systems, and system architectures. Likewise, the first pen-based PDAs (Personal Digital Assistants) all look very much the same, too: a tiny box with an LCD screen and a stylus.

But appearances, once again, are deceiving. Some devices that claim to be PDAs aren't PDAs at all without absurdly stretching the definition. They're aimed at widely different markets, and they have little in common but portability.

Their differences become even more apparent after a technical analysis of their underlying architectures. Some PDA-type devices are scaled-down desktop computers, while others explore bold new territory. Constraints of cost, compatibility, memory, CPU power, size, weight and battery life have forced their designers to make very different sets of compromises and trade-offs. Even if you isolate the two devices that appear almost identical – the Apple Newton MessagePad and the Tandy/Casio Zoomer – you discover that their supporting architectures are sharply divergent, though perhaps in ways that won't become obvious to casual users until future iterations.

At the same time, the early PDAs also have several things in common. They're all rather pricey compared to other electronic gadgets aimed at the mass consumer market. They all squeeze large amounts of computing power into amazingly small packages, but in some cases it's not enough power to satisfy their ambitious aspirations (handwriting recognition in particular). They all come with a suite of useful applications such as notepads, address books and appointments calendars, but no 'killer application' such as VisiCalc or WordStar that dramatically reveals new possibilities.

Are PDAs ready for prime time? Are they worth the price? Can they justify their existence by doing anything important? Or will they be doomed to early failure, banished to their design labs until the technology catches up with our expectations?

This partially depends on what you expect from a PDA and how much you're willing to pay. Most people will probably be disappointed with the early PDAs or will guard their wallets until prices drop. But a remarkable number of companies are gambling on hopes that thousands of people will think PDAs are the best thing since sliced silicon.

PDAs are seeking a niche, but they're not just niche products. They're ultimately aimed at the millions of people who will probably never buy a personal computer, and they're destined to have a major impact on personal computing at large. PDAs already are accelerating the trend toward wireless communications and will encourage the online distribution of software. More important, one of these tiny devices adopts a new approach to system software that foreshadows the object-oriented operating systems that will be coming to desktops later in the decade.

What's a PDA?

Not surprisingly, there is no industry-wide consensus on what constitutes a PDA. Because Apple chairman, John Sculley, coined the term in January 1992 and guided the Newton architecture's development, it's tempting to let Apple define the grounds of this debate. However, that wouldn't be fair to Apple's competitors, and it may not take into account the expectations of users.

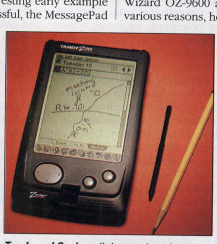
Apple's MessagePad, the first in a family of products based on the Newton architecture, is the most interesting early example of the genre. If successful, the MessagePad will be widely imitated because, unlike the proprietary Macintosh, the Newton architecture is openly licensed to all comers. The list includes Cirrus Logic, Matsushita, Motorola, Sharp and Siemens. Sharp, which manufacturers the MessagePad for Apple, is also selling a variant called the ExpertPad.

However, Sharp is hedging its bets with a tablet-sized device called the PT 9000 that isn't based on Newton technology (see the text box 'Sharp's non-Newtonian PDA' on page 72). Instead, the PT 9000 uses the GEOS operating system from GeoWorks.

Another important GEOS-based system is the result of a partnership between Tandy and Japan-based Casio, with significant input from GeoWorks and Palm Computing. Now owned by AST, the Zoomer (as it is nicknamed), is perhaps the MessagePad's closest competitor in terms of appearance, user interface, and intended audience.

Eo Incorporated in the US has developed the Eo 440 and 880 Personal Communicators, a pair of clipboard-sized pen computers based on AT&T's Hobbit chip and Go Corporation's PenPoint operating system. The Eo 440 and 880 perform many of the same functions as the MessagePad and the Zoomer, and in some ways they do a better job of it. For instance, their larger screens are more suited for creating documents, they can receive faxes as well as send them, and they can be equipped with cellular phones. Nevertheless, the Eo devices are not PDAs. Unlike the Zoomer and the MessagePad, they make no pretence about being consumer products.

Other contenders in this category include the Hewlett-Packard 100LX, a DOS-based palmtop computer; and pocket-sized personal organisers, such as the Sharp Wizard OZ-9600 and the Casio Boss. For various reasons, however, they fall short of what we expect from a true PDA.



***Tandy and Casio** collaborated on the Zoomer, a PDA that strongly resembles the Apple MessagePad but is built on a completely different hardware and software architecture*

Sculley risked inflating those expectations over the past two years by making Newton the most visible work-in-progress in Apple's 17-year history. But users' expectations have also been influenced by Gene Roddenberry, the late creator of Star Trek.

Roddenberry first introduced PDAs to the public in 1966. When *Star Trek* was still in its conceptual stages, he decreed that no paper or pencils were to appear anywhere on the sets of the Starship Enterprise. Instead, crew members jotted notes on electronic tablets that eerily resemble an Eo 880, and they used a handheld device called a tricorder to gather, process and display information. On *Star Trek: the Next Generation*, the sequel to the original series, crew members communicate remotely by speaking into active-badge-like devices worn on their tunics.



***Apple's MessagePad** is promised to be the first in a family of products based on the Newton architecture. Newton licensees are planning to introduce everything from smart telephones and fax machines to advanced cable TV convertors*

This futuristic vision of multifunction handheld computers, wireless communications, and an effortless user interface is the inspiration for today's PDAs, even if some designers do not acknowledge or are not consciously aware of the pop-culture source. Unfortunately, they have to meet twenty-fourth-century expectations with twentieth-century technology.

Still, the vision yields a practical definition of a PDA. At a minimum, a PDA should have significant computing power and be capable of performing a number of different functions, which rules out high-end calculators and dedicated language translators. It should be easily held in one hand, usable almost anywhere while you are standing or sitting, and capable of running on battery power for extended periods of time, which rules out laptop and notebook computers. It should offer flexible communications, at least within the bounds of today's rapidly evolving but still-limited infrastructure, which rules out most personal organisers. And, most challenging of all, it must be so affordable and easy to use that it will attract the millions of people who have thus far steadfastly resisted desktop PCs.

"We're not talking about a downsized personal computer," said Michael Tchao, manager of product planning and strategy for Apple's Newton Group. "We're not talking about Lotus 1-2-3 in the palm of your hand. We're not talking about pocket PageMaker. We're not talking about a little-bitty Microsoft Word with little-bitty keys and little-bitty menus. We're taking about a new class of device and a new category of users."

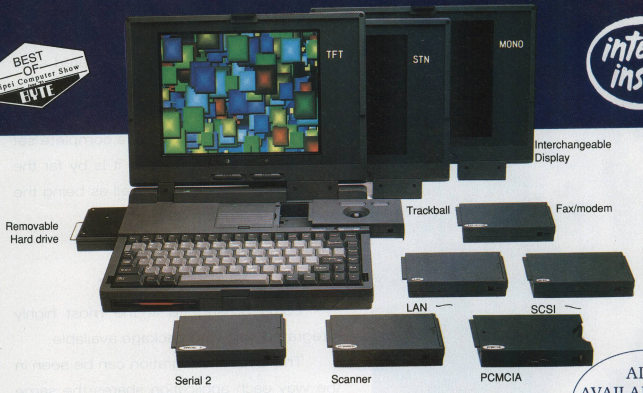
However, no device currently available meets all these criteria, especially at an affordable price. Like colour TVs, VCRs, CD players, and other consumer electronics gadgets, PDAs won't become genuine mass-market items until prices drop below $500, and ideally even lower.

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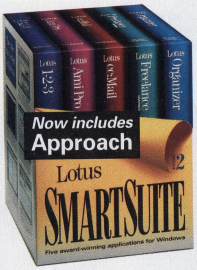
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Lotus SMARTSUITE

Sharp's non-Newtonian PDA

BY ED PERRATORE

When it comes to handheld computing, Sharp seems determined to cover all the bases. The company is largely responsible for building the personal organiser market with its Wizard series, and it is the first Newton licensee to announce a MessagePad-type product, the PI-7000 ExpertPad. Sharp will also shortly announce another type of small computer with PDA-like functionality aimed at current PC users, the PT 9000.

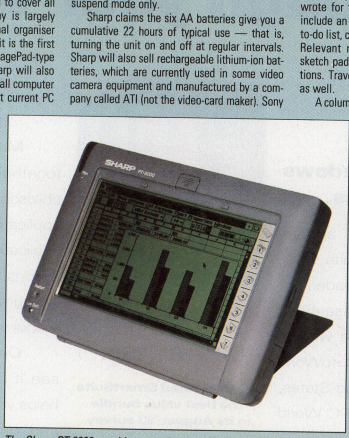
This system is a cross between a subnotebook and a true PDA in size, operating system (GeoWorks' GEOS), and applications. Sharp believes that many prospective buyers will have difficulty with the PDA concept — that of a semicomputer consumer product — so they might be inclined to go with a more familiar form factor.

The PT 9000 measures about 9 by 7 by 1.5in and weighs roughly 0.9kg with six AA batteries installed. It has a super-twist nematic, black-and-white, 640-by-400 pixel (eight grey shades), non-backlit screen. The PT 9000 screen is both pen and touch-capable. In other words, you can use, say, your finger rather than a stylus, although for some menu choices anything larger than a stylus point would frequently make incorrect selections.

Around the outside edge are one PCMCIA Type II slot and one Type III slot (on opposite ends of the unit), serial and parallel ports, an external keyboard connector, an external floppy drive connector, and an AC adaptor port. Sharp will sell an external floppy drive, an AC adaptor, and a subnotebook-sized external keyboard.

Inside is a Vadem VG230, a 16MHz 8086-class (16-bit) processor that incorporates functions such as a memory controller through VLSI technology. Standard are 1M of RAM, which is upgradable by way of plug-in cards to 3M, and 6M of ROM for the operating system and applications. The power button takes you to suspend mode only.

Sharp claims the six AA batteries give you a cumulative 22 hours of typical use — that is, turning the unit on and off at regular intervals. Sharp will also sell rechargeable lithium-ion batteries, which are currently used in some video camera equipment and manufactured by a company called ATI (not the video-card maker). Sony is also making this type of batter under licence from ATI; Panasonic will begin selling it next year. In the PT 9000, two lithium-ion batteries fit where the six AAs would go and provide you with a claimed 24 hours of typical use.



The Sharp PT 9000 provide several ease-of-use features, such as the column of assignable icons on the right that allow you to turn immediately to a particular application or file

Bundled GEOS software includes the usual GeoWorks group: a word processor, a spreadsheet, communications software, and a database manager. Also in ROM, but not a part of GEOS, is a personal information manager from Palm Computing that's very similar to what Palm wrote for the Zoomer. Other mini-applications include an address book, scheduler, note taker, to-do list, calendar, calculator and a world clock. Relevant mini-applications let you invoke a sketch pad with a mini-toolbar of editing functions. Traveling Software's LapLink is included as well.

A column of buttons runs down the side of the screen — three of the buttons are assigned, five are customisable. You can use these five for shortcuts to commonly used applications, and you can even assign an icon to a file.

Early impressions

The beta unit of the PT 9000 I looked at appears significantly faster than the 8-bit Tandy/Casio Zoomer. Handwriting recognition, like the Zoomer's, is disappointing, but you have the choice of keeping text you've scribbled as ink or having the software translate it. In fact, you can toggle between a bit-map and a botched recognition job. The software recognises block letters only.

One nice feature is the ability to delete previous strokes of the stylus — the vertical line of a T, for example — to keep you from having to write something all over again. Thanks to the GEOS operating system, the PT 9000 offers multitasking and multithreaded execution.

For now, Sharp will say only that the PT 9000 will be priced below $US1000. Like true PDAs, however, it's a risky venture at any price — the first keys to mass-market acceptance are more wax than gold. But by sticking closer to existing notebook technology than to new architectures from the MessagePad and other PDAs, Sharp's hybrid offering may help sell the overall concept of handheld computing for the entire industry.

The mighty pen

Not everyone will agree with this definition, however, particularly those whose PDA-like products it excludes. For example, the Eo 440 and 880 are capable machines, but at $US2000 to $US3300, they're clearly not intended for mass consumption, not even in the US. The HP 100LX and Sharp Wizard are often considered PDAs, but they have QWERTY keyboards. Although there's disagreement on this point, those who target the mass market convincingly argue that keyboards are simply too intimidating for the computer-illiterate.

"If you're designing a device for broad consumer acceptance, you've got to have a pen interface," said Joe Ratner, Zoomer project manager for Radio Shack. "From the very beginning, we decided the Zoomer had to have a pen interface. It couldn't have a keyboard."

Ratner explains that it's impossible to fit a touch-typable QWERTY keyboard on a

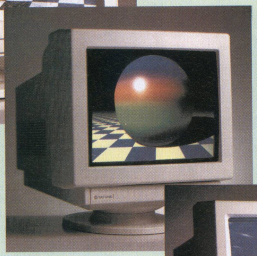
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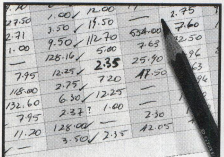
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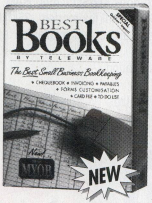
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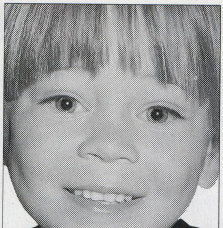
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pocket-sized device, and crowded keyboards that have dozens of multifunction keys are even more intimidating to consumers than a full-sized desktop keyboard. His counterparts at Apple, who interviewed more than 1200 consumers while designing the MessagePad, came to the same conclusion.

Gerry Purdy, vice-president and chief analyst for mobile computing at US research firm, Dataquest, predicts that QWERTY-based devices such as the 100LX and Wizard are "going the way of the slide rule:" PDAs will eventually replace them.

The point is that PDAs aren't substitutes for PCs; they're different devices aimed at a different market. "I'm not expecting to replace my desktop computer or my laptop with a PDA, but I'm definitely going to have a PDA," said Jeff Hawkins, founder of Palm Computing, who first conceived the Zoomer while working at GRiD Systems. "For heavy-duty text writing, pen input won't replace a keyboard."

PDA designers think their devices are more likely to be used by consumers of information than by creators of information. Therefore, user input will tend to be brief and frequently limited to selections from menus. Those who need to enter lots of data will use conventional computers, although some PDAs, such as the Sharp PT 9000, will offer keyboards as an option.

"But a pen interface doesn't necessarily mean the same thing as handwriting recognition," Ratner pointed out. "For some applications, you don't need recognition. Digital ink is good enough."

Digital ink — storing the image of the user's handwriting instead of translating it into ASCII text — is one of the trade-offs juggled by designers of today's PDA's (see the text box, 'Ink vs ASCII', on page 76).

PDAs tend to look alike, so one way of telling them apart is to peel back the surface. Their underlying architectures determine not only what they can do now, but also what they'll be capable of doing in the future as the technology advances.

Operating systems of the future

Some operating systems running on PDA-type devices are descended from those of desktops: DOS, GEOS, Windows for Pen Computing. Others are dedicated to proprietary hardware and don't attempt to duplicate the functionality of a full-fledged operating system. These include those of the Sharp Wizard and Casio Boss. Some operating systems, such as Magic Cap from General Magic and WinPad from Microsoft, look promising but haven't yet appeared in actual products.

Only two operating systems currently available were designed from the ground

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Ink vs ASCII

It'll be a long time before handwriting recognisers are as good as pharmacists at interpreting anybody's sloppy scrawl. Therefore, the designers of today's PDAs must compromise the ideal of always recognising everything a user writes. One alternative is to minimise freehand pen input by offering selections in menus. Another is to capture an image of the user's handwriting without attempting the difficult translation into ASCII text.

The latter approach is known as *digital ink*. Some PDA designers contend that digital ink is not a compromise or a workaround. For certain applications, they say, ink is an entirely appropriate data type. Often-cited examples include brief reminder notes and entries in appointment calenders. In neither case, they argue, is a user likely to need full-text searching or sorting, the main advantages of ACSII text.

"There's an underlying assumption that 'before I can do useful work, it's gotta be in ASCII'," notes Gregory Stikeleather, president of Aha Software, which makes an ink-oriented word processor called InkWriter. "That isn't always the case."

Still, it's hard to believe that universal recognition wouldn't be implemented if it were reliable, adaptable, and didn't tax a PDA's resources. For one thing, byte-coded text requires less storage space than digital ink — an important consideration for handheld devices with small RAM-based file systems. And there's always the chance that a user might indeed want to search a series of reminder notes for a key phrase or look for a particular name in a large appointment book.

For the immediate future, though, digital ink will be an integral feature of PDAs, and designers are taking different approaches to it. These differences are typified by Apple's MessagePad and Tandy/Casio's Zoomer.

Both of these PDAs let you tap an icon to switch the handwriting recognisers off. This lets you write freely in digital ink, which the computer captures and stores as a graphical image. This image is not a simple bitmap of pixels, however. Both PDAs save your writing as vectorised strokes, similar to the difference between bitmap fonts and outline fonts. When compressed, the strokes require less storage space than bitmap images and also preserve information that could be useful later.

The Zoomer makes the best use of this information. It supports *deferred recognition*, the ability to translate ink into text anytime after it's captured. You merely select the ink, turn on the recogniser, and confirm that you want to translate the writing into text.

This is where saving penstrokes becomes important. It's much easier for a recogniser to interpret stroke data instead of a plain bitmap, because the strokes preserve the way in which a character is written, not just its image. If nothing more than a bitmap were saved, the recogniser would be reduced to optical character recognition, which is not very reliable for handwriting.

The MessagePad doesn't support deferred recognition, although nothing in the Newton Recognition Architecture precludes it from being added in the future. Apple gives two reasons for this decision: realtime recognition saves storage space; and usability testing has showed that people tend to write much sloppier when the recogniser is off, making it more difficult to recognise.

As a result, the MessagePad's approach to digital ink is somewhat less flexible than the Zoomer's. In truth, however, the Zoomer probably needs digital ink more than the MessagePad. The Zoomer's recognition is noticeably slower (a consequence of the Zoomer's 8088-compatible CPU versus the MessagePad's ARM610 RISC chip); it's less adaptive (it recognises only printing, not cursive writing, and it isn't trainable); and it is somewhat less accurate (based on results of preliminary tests).

A key difference between the two recognisers is that the Zoomer interprets words character by character, while the MessagePad lets you choose between a dictionary-based system, character-by-character recognition, or a combination of the two. Normally, the MessagePad tries to find each word you write in its 10,000-word dictionary. If it can't find a match, and if the character-by-character option is off, the MessagePad makes a guess — often a very wild guess. For example, the MessagePad stumbled badly on the proper name *Halfhill*, even though both parts of the compound word were in its dictionary. Five attempts yielded these five guesses: *florists, teachers, forecasts, four their,* and *Clarence.*

One solution to the problem is to add the word to the dictionary by spelling it on a pop-up QWERTY keyboard. Once I added *Halfhill*, the MessagePad got it right every time. The other alternative is to activate the character-by-character option, which works fairly well but slows down the recogniser and reduces overall accuracy.

The Zoomer's answer is to always offer the option of digital ink — unlike the MessagePad, which offers it only in certain applications. "If I were writing poetry, a dictionary-based recogniser would be great," commented Jeff Hawkins, founder and chairman of Palm Computing. "But when you start writing names and other words that aren't in the dictionary, you start running into problems."

up to support PDAs: Go's PenPoint and Apple's Newton Intelligence. Both are heavily object-oriented and depart from the traditional model used by today's operating systems for desktop computers.

Newton Intelligence borrows a few of its components from the Mac: portions of QuickDraw (the Mac imaging engine) handle the MessagePad's display, and an AppleTalk protocol stack supports name lookup, zones, data streams and printing, although there's currently no support for AppleTalk Remote Access. Newton Intelligence is multitasking and extensible, and Apple plans to distribute software updates and extensions via online services.

The Newton operating system consists of four major components: the Recognition Architecture, the Communications Architecture, the Information Architecture, and the Intelligent Assistance. Most of it is written in C and C++, with a small portion of the low-level kernel written in assembly language. The user-interface layer is coded in C, C++ and Newton Script, a new language that combines features of C and Pascal. NewtonScript is the development tool for all Newton applications software, including the programs that are burned into the MessagePad's ROMs. Drivers and other low-level functions that access the MessagePad's hardware directly are best written in assembly language.

The Recognition Architecture has a recognisor engine that translates your printing, cursive writing, or any combination of the two. The recognisor was designed by ParaGraph International, a US/Russian joint venture based in Moscow and Sunnyvale, California. It's trainable, automatically adapting to your handwriting style over time.

Similarly, a graphics interpreter detects specific objects and penstrokes as you sketch on the display. For example, it automatically transforms a round scribble into a perfectly formed circle; four perpendicular lines become a precise rectangle. Both the handwriting recognisor and the graphics interpreter detect several predefined gestures for manipulating words and shapes. You can move objects, resize them, and cut and paste them on a system clipboard.

Newton's Communications Architecture supports a wide variety of I/O devices via the MessagePad's RS-422 serial port, PCMCIA slot, and 19.2Kbps infrared transceiver. The serial port connects to printers, fax modems and desktop PCs. The

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What makes a PDA?

	Portability	Battery life	Low price	Mass market	Ease of use	Wireless communications	Applications	Pen
Apple Newton MessagePad	●	○	◒	●	●	◒	●	●
Tandy/Casio Zoomer	●	●	◒	●	●	◒	●	●
Sharp PT 9000	◒	●	◒	◒	●	◒	●	●
Organisers (Sharp, Wizard, Casio Boss)	●	●	●	◒	◒	○	◒	○
DOS-based hand-helds (HP 100LX, Fujitsu Poqet PC)	●	●	◒	○	○	◒	●	○

● = well suited ◒ = adequate ○ = not well suited

PDAs are defined as highly portable, easy-to-use computing and communications devices aimed at the mass market. To be highly portable, the unit must be easily held in one hand and able to be carried in a pocket. Long battery life is also an important factor; you don't want to worry about being near a power outlet all the time. Ease of use assumes no keyboard; most people don't type well. For now, a pen interface is the preferred means of input, although someday voice input might supplement it. To appeal to the mass market, PDAs must be low in cost, and they must come with a good suite of general purpose applications. Finally, PDAs must deliver seamless two-way wireless communications for fax and data access

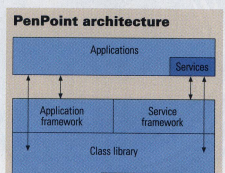
Type II PCMCIA slot accepts wireless communication cards and other add-ons. The infrared link lets you beam data to another MessagePad or a Sharp Wizard OZ-9600. This architecture is extensible, so new communications options can be added in the future.

A central data bank

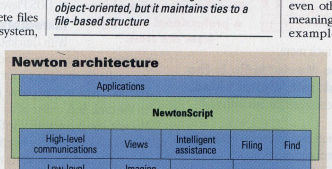
What sets Newton Intelligence apart from the typical desktop operating system is the Information Architecture. It's datacentric, not filecentric, a radical departure from DOS, System 7, Unix, and other common operating systems. PenPoint has a very similar structure, although it doesn't go quite as far as Newton in abandoning the old file-oriented model. Both Newton and PenPoint give us a likely preview of the object-oriented operating systems from Microsoft (Cairo) and Taligent (Pink) that are coming to desktops.

Instead of storing data in discrete files organised in a hierarchical file system, Newton Intelligence lumps everything together in an object-oriented central repository that's accessible to all applications. Technically, this is known as a persistent object store, and it promotes data-sharing among applications without the complex plumbing that's now being retrofitted to operating systems for desktops.

Because conventional operating systems segregate information in files, applications can't share live data until the operating system is equipped with a mechanism such as Microsoft's DDE or OLE, or Apple's Publish/Subscribe or Amber/-Opendoc. Although these mechanisms work, they add yet another thick layer of code that wasn't anticipated in the original architecture of the operating system. They also force developers who want to take advantage of the new features to modify their code to expose internal objects to other applications. If the code isn't already object-oriented, extensive rewriting may be necessary. Both Microsoft and Apple are in the process of pulling their respective developer communities in these new directions.



PenPoint, like Newton intelligence, is object-oriented, but it maintains ties to a file-based structure



Newton intelligence is object-oriented from the ground up. Most programmers will access MessagePad resources and write applications using NewtonScript

Newton's Information Architecture takes a different approach to data storage and sharing. When data enters the MessagePad, the Information Architecture automatically tags (that is, names), compresses and saves the data in an object called a *frame*. A frame is a structure composed of tagged locations called *slots*. Slots can contain user data, program code, and even other frames. As objects, high-level meanings can be attached to frames: for example, **address** can represent '1 Phoenix Mill Lane'.

A collection of related data frames is known as a *soup*, and soups reside in physical locations called *stores*. For instance, a soup of contact names might exist in a store located on a PCMCIA RAM card. Soups automatically maintain indexes to their frames.

This unified model means that all information stored in the MessagePad automatically becomes part of an object database that Newton applications can search, modify and display in countless ways. It eliminates the overhead of data translation and the redundant copies that often



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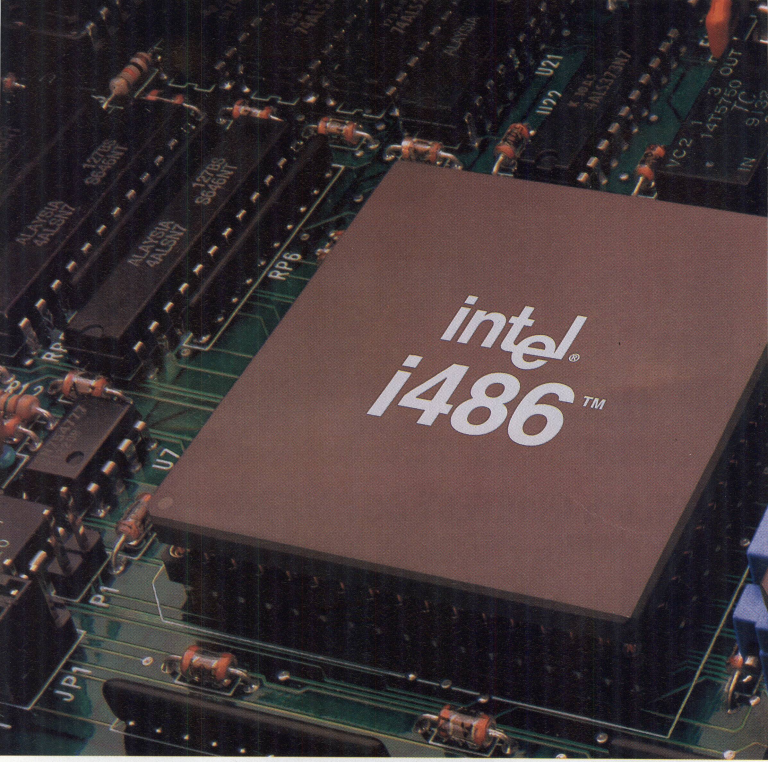
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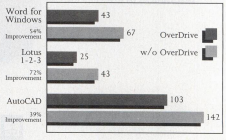
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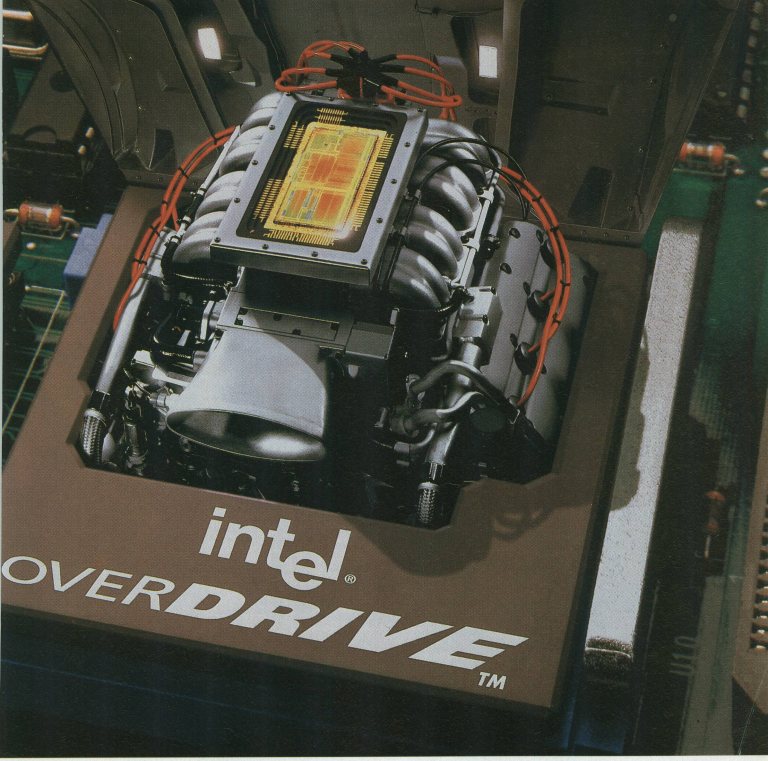
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PDA CPUs: New form demands new functions

BY DICK POUNTAIN

The new battery-operated, handheld PDAs demand a new class of CPU, and semiconductor manufacturers are all rushing to pick up a piece of this potentially huge market. It seems like vendors announce new PDA-class chips every week, all offering different and non-Intel-compatible architectures. To understand how this has come about, consider the features a PDA processor chip should have.

Low cost. PDAs are aimed at the consumer market. In a unit that costs around $500, the CPU cannot cost more than $40 to $50. Thus, PDA designers can forget about using 486DXs and Pentiums, which cost hundreds of dollars each.

Smallness. Printed-circuit-board space is at a premium in any handheld device.

Very low power requirements. Battery life for a PDA needs to be an order of magnitude better than that of a laptop PC, allowing weeks or months between battery changes. Another important threshold that PDA designers are aiming for is operation on just two AA-size batteries.

Power. Although PDAs are pocketable, don't confuse them with pocket calculators; the kinds of applications promised by, for example, Apple's MessagePad, require as much processing power as a high-end desktop PC. Handwriting recognition in particular consumes lots of realtime computing power.

High integration. The chip should contain a lot of peripheral functionality, such as RAM, ROM, and various controllers, that would otherwise require external chips.

Ability to run compact code. This reduces the amount of ROM and RAM needed to store the software.

These requirements are not wholly independent; for example, smallness and low cost go together, as a chip's price in volume production is related to its die size (that is, the amount of silicon it contains). On the other hand, smallness and high integration fall on opposite ends of the spectrum and call for trade-offs. 'Small and powerful' nowadays means RISC, and almost all the PDA chip designers start with a compact RISC processor core (typically one with 30,000 to 40,000 transistors) and then add peripheral units to taste. Because PDAs represent a completely new software market in which PC or Mac compatibility is arguably not necessary, CPU makers are free to use leading-edge technology.

The players

Although very few PDAs have actually been shipped so far, a second generation of processors is already being announced. The two first-generation PDA processors are the UK-designed ARM610 (Advanced RISC machine), which is used in Apple's Newton MessagePad, and the AT&T 92010 Hobbit, which is used in Eo's Personal Communicators. Both are 32-bit RISC designs, but the Hobbit is unusual in its use of an on-chip hardware stack, which is optimised for executing C function calls, instead of the large register file typical of a RISC CPU.

Both chips contain a cache and a memory management unit to support virtual-memory operating systems, but otherwise they show only modest integration. The Hobbit, for example, is part of a five-chip family that together make a PDA.

The second-generation PDA chips, which come from Japan, are Hitachi's SH7000 series and NEC's V800 series. While the ARM610 and the Hobbit are general-purpose RISC CPUs, these newcomers resemble microcontrollers on steroids. Both are based on 32-bit RISC cores with greatly simplified architectures.

Hitachi's SH7034 chip is a highly integrated device, with 4K of on-chip RAM and 64K of PROM, a DRAM controller, a four-channel DMA engine, twin serial ports, an eight-channel A/D convertor, and a whole slew of timers and pulse generators. The SH7032 has no PROM, but it has a total of 8K of RAM. Both SH CPUs feature a 16-by-16-bit integer multiply and accumulate instruction that executes in one to three cycles, enabling fast digital signal processor-style signal and image processing. You could build a simple PDA around the SH by adding only display and PCMCIA controllers.

NEC's V810 is not as integrated, but it includes a single-precision FPU; a 16-bit-bus version, called the V805, is probably the smallest and lowest-powered CPU chip currently available. The forthcoming V820 will have DMA, with serial ports and timers located on-chip, like the Hitch SH series. Nintendo is rumoured to be designing the V810 into a forthcoming CD-ROM games machine.

CISC chips are not entirely excluded from the PDA scene: Motorola designed its 68349 Dragon 1 in collaboration with General Magic for use in PDAs based around General Magic's Magic Cap operating system. The Dragon is 68000-compatible and has integrated data RAM and DMA and serial ports. However, Motorola also plans a fast RISC PDA chip based on the PowerPC.

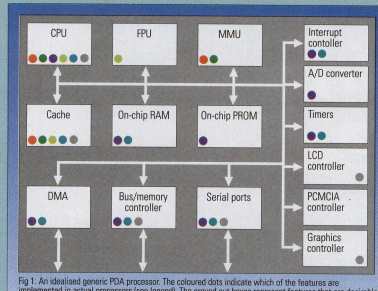


Fig 1: An idealised generic PDA processor. The coloured dots indicate which of the features are implemented in actual processors (see legend). The greyed out boxes represent features that are desirable but are not yet implemented in any current products.

CMOS a must

All these chips are implemented in fully static CMOS so that you can slow or stop the clock and then restart it without losing the processor state. The Hitachi SH and Motorola Dragon chips include special sleep instructions that stop the CPU but continue to time the peripherals; the SH also has a standby mode that stops everything and reduces power consumption to a few microwatts. The Hob-

bit, ARM610, and V810 can be put into a similar state by external clock logic. All the chips come in low-power 3.3V versions, but only NEC's V810 can currently operate reliably on the 2.7V you get from two tired AA batteries.

Hitachi and NEC have made code density an issue for PDA processors, a reflection of their experience with embedded processors, where much of the software is held in on-chip ROM. The Hitachi SH employs a 16-bit instruction format, so its programs are only 60 to 70 per cent the size they'd be on RISC chips with 32-bit instructions. The downside of these short instructions is some awkwardness, particularly with address arithmetic.

The NEC V810's instructions are mostly 16-bit with just a handful of 32-bit, while the Hobbit uses a variable-length encoding scheme that also yields good code density. The ARM610 uses all 32-bit instructions but shortens its code by condensing condition tests and operations into a single op code (for example, **`ADDEQ, add if z flag set).`**

Benchmark figures are even more contentious than usual in the PDA arena, as there's little agreement about the conditions under which power consumption, speed, or MIPS per watt should be measured. Rather than step into this hornet's nest, I'll just quote ballpark figures. Power consumption for the CPUs mentioned here all lie in the range bounded by the NEC V810's 100 milliwatts and the Dragon's 300 mW (all at 3.3V), an order of magnitude less than the three to five consumed by a typical desktop 486. NEC claims the V805 consumes only 28 mW at 2.2V and 10MHz. Apart from the Dragon, all the chips can process at 15 to 20 MIPS, placing them squarely in the 486 league.

Most observers agree that the NEC V805 offers the best MIPS-per-watt rating right now, but expect the lead to change continually as the CPUs are fabricated in better processes and with different degrees of integration. When comparing power consumption between a highly integrated CPU such as the Hitachi SH and one with fewer functions such as the NEC V805, you should add in the likely consumption of all the extra support chips that the latter chip requires. However, this is rarely feasible in practice.

An integrated future?

Adding more functions increases a chip's die size and hence its price, but so long as all those functions are useful there should be a net savings, thanks to the reduced external chip count. A highly integrated chip like the Hitachi SH will be cost-effective so long as you design a PDA precisely around the functions that it provides.

Another possible strategy, however, is to go with custom integration. Both ARM and NEC are offering their tiny RISC cores as macro cells for embedding into customised application-specific ICs, which could contain a set of peripheral functions precisely matched to a particular PDA's design. For example, by migrating to a 0.6-micron CMOS process, ARM should be able to fit most of the MessagePad's functionality (that is, graphics, LCD, and PCMCIA controllers) onto a future CPU chip.

Intel and VLSI Logic recently revealed two PDA chip sets they're developing as a joint venture, based on Intel's 386SL and 486SL power-managed CISC processor cores. Code-named Polar (386) and Draco (486), both are twin-chip sets with one chip containing the CPU core, cache, memory and bus controllers, and a Windows-compatible graphics accelerator subunit, while the other holds keyboard, mouse, serial I/O, pen, and floppy and hard disk controllers, and an HP-SIR infrared link.

Power management circuitry will be able to switch off individual peripherals according to demand, although no power or speed figures were available at press time. VLSI's high-bandwidth 25-pin ML bus is used to connect the chips together, which keeps the total pin count for the set to a reasonable 276. When the Polar and Draco chipsets become available shortly, you'll be able to design a PDA by just adding a PCMCIA controller chip.

In the end, it's likely to be consumer acceptance of PDA software that will determine the winners and losers among these CPUs, rather than their relative technical excellence. Those that achieve sales volume will survive. As PDAs come with most of their software built-in, the after-market for software may be small, making profitability less of an issue than it is in the PC market. You might even see three or four different CPUs become established.

PDA processors compared

	ARM610	Hitachi SH series	NEC V810	Motorola Dragon	Intel Pentium
Die area (square mm)	71	92	53	100	294
Transistors	359,000	593,000	240,000	550,000	3.1 million
Cache	4K	8K*	1K	1K	16K

* On-chip RAM

Compared to the Pentium, PDA CPUs seem puny in size, yet many deliver considerable punch. Small size and high performance are necessary for these small, battery-powered devices

result from translation. Furthermore, because all information is processed as Unicode, the MessagePad readily adapts to foreign languages.

It's in the soup

All of this dovetails with the final component of Newton Intelligence, the Intelligent Assistance. This component takes advantage of the data soup to make plausible connections between the information and your actions. For example, if you ask the MessagePad to 'fax to Lisa', The Intelligent Assistance automatically assumes the sketch you just drew on the screen is what you want to send. Next, it locates all people named Lisa in the object database. If there's more than one, the MessagePad prompts you to make a choice. Then it retrieves Lisa's fax number and generates a fax document. The next time you connect your modem to a phone line, the MessagePad sends the fax. The Intelligent Assistance is also extensible.

Although all these capabilities can (and will) be bolted onto existing operating systems, Newton Intelligence was designed around this datacentric model in the first place, making it considerably more compact and efficient. For example, it easily fits within the MessagePad's 4M of ROM, leaving ample room for several other system components and all the built-in applications software.

Different approaches to objects

PenPoint is built on a similar object-oriented structure, but it doesn't appear to go as far as Newton toward discarding the traditional file-oriented model. PenPoint applications can store data as objects, much like Newton does, but they also have the option of saving documents in conventional file formats such as WKS or RTF. A systemwide import/export architecture translates those files as necessary when they are called by a PenPoint application. Newton applications, on the other hand, might provide backward compatibility with conventional file formats by encapsulating a file within a slot or a frame in the object store.

All these structural details will probably remain transparent to users — unless something goes horribly wrong. That's when the subtle differences between Newton and PenPoint might become more obvious. Newton critics say that its centralised object database could backfire by compromising data integrity and that PenPoint has better safeguards in this respect.

Data integrity is paramount in a RAM-based system, because a crash could corrupt all of a user's accumulated data, not just a single file associated with a single

application. PenPoint was designed with extensive memory protection, so applications are effectively 'walled off' from each other. The walls keep one application from interfering with another application's data or from crashing the whole system. To keep those thick walls from impeding IAC (Interapplication communication), PenPoint has a system-level messaging mechanism that allows PenPoint applications and their objects to interact with each other.

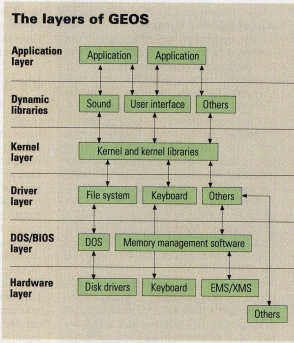
Memory protection is receiving close attention in the design of multitasking operating systems, and it's a key feature of Microsoft Windows NT and IBM's OS/2 2.1. But Apple says the kind of memory protection found in PenPoint adds too much overhead to data-sharing between applications and that Newton's Storage Manager protects the integrity of the central repository in better ways.

Newton applications never access the object database directly, explains Larry Kenyon, principal engineer of Newton Intelligence. Instead, all reads and writes are handled as transactions and funnelled through the Storage Manager's I/O system, where a sentry verifies the data before updating the object store. "Applications can't even touch the data," said Kenyon, "the sentry is always in place to keep that from happening."

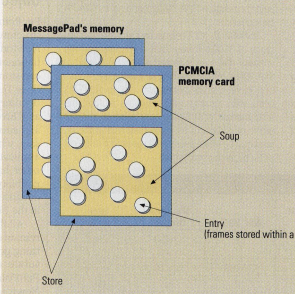
Even if a system crashes or is switched off during a transaction, no data will be corrupted, he claims. Of course, no operating system can prevent loss of data if the hardware is physically damaged or if the MessagePad's main batteries and lithium cell go completely dead. Prudent users still need to back up their data.

The NewtonScript development language provides additional safeguards, says Apple's Michael Tchao. Unlike C, it automatically handles memory management and garbage collection. Applications programmers no longer have to allocate memory, and all references are to objects, not to handles or pointers. Tchao says 80 per cent of crashes are caused by memory management problems and that NewtonScript makes the programmer's nightmare of memory leaks and dangling pointers a thing of the past.

NewtonScript objects also have latent typing, and all operations are type-checked before they're performed. This nails argument errors before they have a chance to trash the stack and cause problems dozens of instructions later.



The GEOS operating system is based on the familiar DOS architecture, but it does make use of some high-level objects for the sake of reducing code requirements for programmers



A store is the physical location of data storage, either main memory or a PCMCIA RAM card. A soup is a collection of related data. Entries are tagged frames of information in a soup. Soups automatically maintain indexes to their entries and can update or remove them on demand

Even if NewtonScript makes life easier for programmers and contributes to data integrity, will developers embrace the new language? Critics say that because NewtonScript is nonstandard and bucks the industry trend toward C and C++, porting code won't be as easy.

But Tchao predicts that programmers will adapt quickly to NewtonScript's hybrid C/Pascal syntax. Based on early experience, he claims development will be faster on the Newton than on other platforms, mainly because there's less code to write. Developers won't have to recompose their applications to run on Newton devices built around other microprocessors, because NewtonScript code is executed by a runtime interpreter. Apple has already received inquiries from about 1500 'serious' developers, says Tchao, and about 50 applications written in NewtonScript will be introduced by Christmas. By the end of 1994, Apple predicts that about 300 applications will be available.

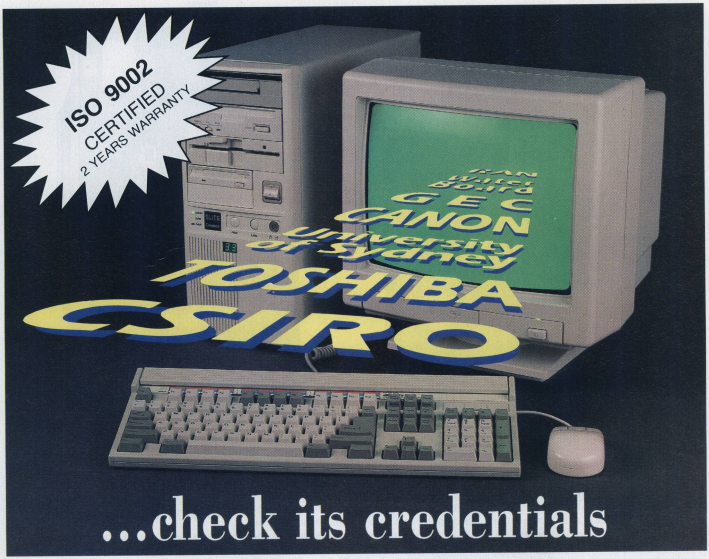
"Any time you invent a new language, the language zealots — and there are a lot of language zealots out there — run screaming from the room," said Tchao. "But we haven't found that to be the case with NewtonScript."

A new user interface

Another consequence of Newton's datacentric architecture is that it discards the old data-processing model of booting an operating system, running and quitting application programs, loading and saving documents, and manoeuvring through hierarchical file systems that mirror the layout of mass-storage devices. Although this model has served us well for decades, it assumes a certain familiarity with a computer system's underlying structure — the difference between an executable file and a data file, for instance, and the hierarchy of directories, subdirectories and files. If PDAs are to successfully penetrate the mass market, these assumptions have to be abandoned.

The MessagePad has no start-up sequence, and you never explicitly load or run a program on it as you do on a desktop PC. Instead, you simply flick on the

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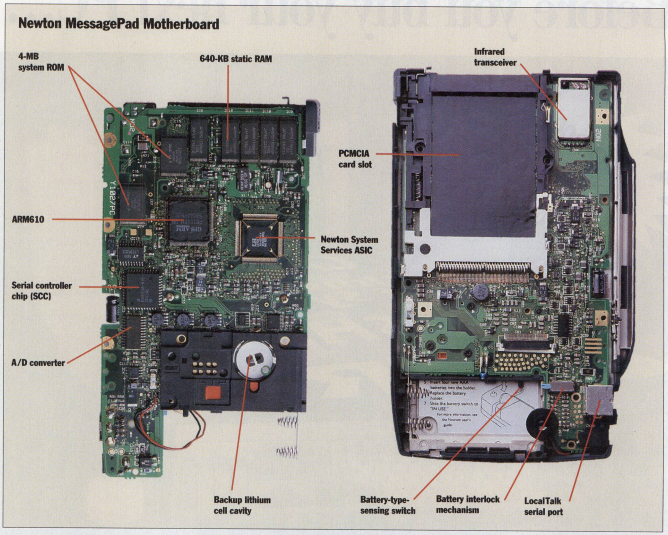
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power switch, and you automatically return to the same application and document that was active during your last session. You move smoothly from one application to another by tapping its icon. To the casual user, it appears that all applications are always running, although actually the operating system is transparently swapping chunks of code in and out of the computer's RAM (640K on a standard MessagePad).

When you move to a different application, you find yourself at the exact spot in the last document that you created with that application. To switch documents, you simply tap on an icon. You never have to explicitly load or save a document; any changes you make are automatically updated in the central database.

Nor must you deal with a file system that exposes the detailed structure of the system's mass storage. You can call up a scrolling list of notes that you've created, but you can't view a 'disk directory' that mixes data files with executable and auxiliary files. Newton saves documents chronologically, and you can organise them into folders if you want to do so, but the nuts-and-bolts framework of the storage system always remains hidden. This is a greatly abstracted extension of the Mac's file system, which shows only one icon for an executable file, even though it actually consists of separate files for the resource and data forks.

PDA designers consider such details extremely important. Apple says it went so far as to hire a cultural anthropologist to observe people and notice how they use such things as Post-it Notes and other traditional tools. "You have to go beyond ease of use and provide assistance to the user," said Shifteh Karimi, user studies manager for Apple's Newton Group.

Again, PDAs are giving us a peek at the future. Desktop computers are moving toward the same datacentric philosophy, although retrofitted solutions such as OLE 2.0 and Amber/OpenDoc are not as elegant. Desktop PCs could also benefit from Newton's abstract file system, as mass-storage devices with gigabyte capacities strain users' ability to find individual files in deeply nested stacks of folders and subfolders.

The Zoomer's architecture

Apple is by no means alone in recognising the value of a new user interface for a product aimed at the masses. The Zoomer takes a strikingly similar approach, even though it's built atop an entirely different architecture.

While Apple spent millions of dollars infusing the MessagePad with the latest technology — an advanced operating system, an optimised development language, an ARM610 (Advanced RISC machine) RISC chip — Tandy tried to reduce costs by building the Zoomer with tried-and-true parts. Casio designed an Intel-compatible CPU that's equivalent to a 7.5MHz 8088. GeoWorks adapted its desktop GEOS environment to reside in ROM. Palm Computing wrote almost all the applications software in assembly language and created an extremely compact handwriting recognisor that fits in 48K. Intuit contributed Pocket Quicken, a mobile version of its best-selling money management program.

But despite their different evolutionary paths, the MessagePad and the Zoomer

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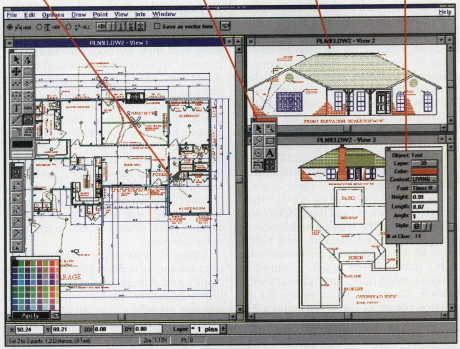
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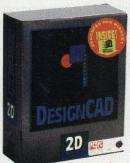
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could appear very much alike to casual users. Not only do they look like twins, but they'll also hit the street at about the same price, ($1495 and $1225), and both conceal their internal complexities with remarkably similar user-interface layers.

Both the MessagePad and the Zoomer are instant-on/instant-off devices that automatically drop you at the same spot in the same document from your previous session. Both allow you to move transparently between applications by tapping on a row of 'hard icons', affixed to the bottom of the screen, or 'soft icons', displayed on the LCD. Both shield you from their underlying file systems, although the Zoomer lets advanced users run a File Manager that exposes the realities of DOS. Both have similar communications capabilities and a suite of applications in 4M of ROM.

Structurally, however, they're worlds apart. GEOS has high-level objects that save a lot of coding for applications programmers, but it has nothing like Newton's object-oriented database.

Applications share data the traditional way: by exchanging (and, if necessary, translating) discrete files or by sending messages. Although GEOS is not chained to the DOS file-system, it maintains the link to DOS for file compatibility. Yet the Zoomer cannot run DOS programs; with the exception of GRiD Penright applications, the ability to run DOS executables was deliberately disabled because of limitations imposed by the 320-by-256 pixel screen.

Naturally, GeoWorks' CEO, Brian Dougherty, doesn't view these differences as a handicap. The Newton architecture is unproven, he points out, and GEOS provides a rich operating environment for PDAs that is being widely licensed to several vendors (including Apple's Newton partner, Sharp). Programs written for the desktop version of GEOS can be ported to the Zoomer without recompiling, because GEOS decouples the user interface from the application code.

The PDA version of GEOS crams plenty into 1.5M of ROM: about 40 printer drivers, an imaging engine, IAC, multithreading, online help, PCMCIA support, high-level objects for programmers, and peer-to-peer networking via the serial and infrared ports. Approximately 1M of this ROM-based code must be bank-switched into RAM, because only the low-level kernel is XIP (executable in place). Dougherty says the next version of GEOS will keep more XIP code in EOM to minimise bank-switching, thus taking some load off the slow CPU.

If the Zoomer's 8088-class CPU wasn't limited to real mode, GEOS could run in protected mode, mapping the ROM into flat address space. With additional RAM, this could eliminate bank-switching altogether and speed up the machine considerably.

Dougherty would love to see this happen. In fact, from the very beginning he pushed Casio to build the Zoomer around a more powerful 80x86 compatible CPU, such as Chips & Technologies' PC/Chip, but he says Casio insisted on using a less powerful chip to maximise battery life. However, future versions of the Zoomer could escape that trade-off. Intel and VLSI Logic are developing a family of highly integrated chips that combine the logic cores of the 386SL and 486SL with other system components to make a two-chip solution for 80x86 compatible PDAs (see the text box 'PDA CPUs: new form demands new functions' on page 82). Neither Tandy nor Casio has announced plans to use the Intel/VLSI option, however.

Early adopters or suckers?

Although the MessagePad and the Zoomer fall short of some expectations and are relatively costly, from a purely technical standpoint they are both undeniably impressive. To succeed as mass-market consumer items, PDAs ultimately must move in volumes measured in the millions.

Apple in particular has a lot riding on this gamble. Newton is one of Apple's answers to Microsoft's 'Windows, Windows Everywhere' strategy, and it's one of the two major projects on which Apple is betting its future. If Newton flops, and if the Mac doesn't make the transition to the PowerPC chip, Apple may not survive the 1990s. At the very least, it could lose its seminal position as a leading-edge computer company.

It may be years before PDAs match the sales volumes of desktop PCs, and whether Apple and others can wait that long depends partly on how many 'early adopters' are willing to go out and purchase the first PDAs and fund the ongoing evolution. Nearly everyone agrees that those early adopters won't be the same people who are the eventual targets of PDAs. "We see the early adopters being PC users, but [sales] quickly moving to people who never considered buying a computer," said GeoWorks' Dougherty.

Dougherty envisions a not-too-distant future when PDAs are as ubiquitous as radios. "The average household has seven radios, and most people don't even realise they have seven radios until they start counting their clock radio, their Walkman, the stereo system, the car radio, and so on. We see the same thing happening with devices like the Zoomer as they get down to calculator prices. And that will happen sooner than you think," he predicts.

Dougherty estimates the bill of materials for a Zoomer-type device to be about $US150, with the LCD being the most expensive component (about $US30). Those costs will drop as volumes grow. Within two years, he says a Zoomer could be bought in the US for as little as $US300. That would put it in direct competition with personal organisers and pocket pagers. Dougherty points out that the current market for organisers is approximately five million units per year worldwide and that pagers are selling at a rate of approximately two million units a month. Dataquest projects that PDA unit sales in the US will grow from 70,000 this year to 3.62 million in 1997.

Like the primitive personal computers of the 1970s, the MessagePad and the Zoomer have an air of future potential, or something young that's just on the verge of making it big. It's only a matter of time before their handwriting recognition improves and new applications are invented for them. They fit well into today's busy lifestyles, and they're perfectly positioned to ride the rising waves of wireless communications and data super-highways. In 10 years, these unassuming little devices could conceivably become the dominant personal computer platform. Desktop PCs will still be around, as mainframes and minicomputers are today, but most 'personal computing' will probably happen on PDAs.

"There's a major intimidation factor with a computer," said Michael Reimer, chief operating officer of ParaGraph in the US. "It has a scary-looking keyboard and a big monitor that stares back at you. The Newton is a very different kind of device: it's small, it's soft. It doesn't intimidate. It's like a Walkman."

However, there are some nay-sayers, too. Michael Homer, Go's vice-president of marketing, predicts that consumers will find the MessagePad and the Zoomer too expensive and disappointing. "I don't think the Newton and the Zoomer are viable machines. There's no magic going on here," he said.

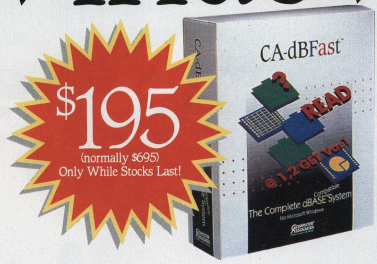
The future of PDAs isn't riding solely on the Newton MessagePad and the Zoomer. Both are promised to be only the first in wide-ranging families of products, and other contenders are poised to enter the race as well. Among the leading challengers will be the first PDAs to be based on Microsoft's WinPad and General Magic's Magic Cap. The millions of R&D dollars spent by Apple, Tandy, Casio, GeoWorks, Palm, Eo, Go and other pioneers will not be wasted. Eventually, someone will leverage the investment into a successful product.

Let's just hope we don't have to wait until the twenty-fourth century for that to happen.

Acknowledgements: Andy Reinhardt, Ed Perratore, Tom Thompson and Michael Nadeau.

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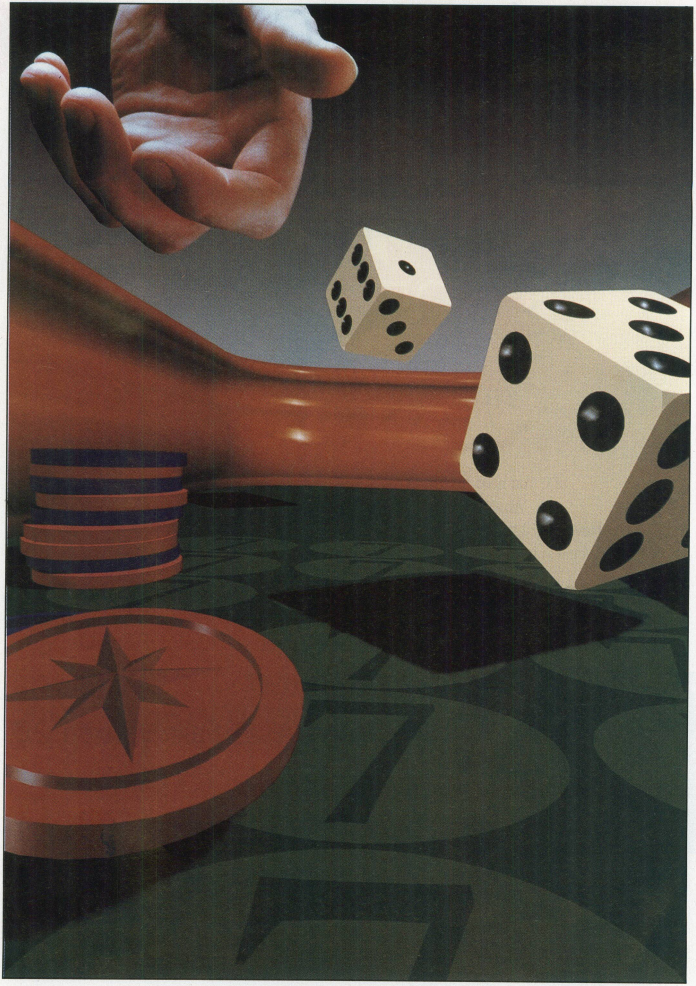
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Deciding on a NOS can seem like you're laying down chips on a game of chance. So make sure the ante and the odds are right for you before you make your choice.

Playing the odds

BY GARY GUNNERSON

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You step out of the darkness. Lights flash. Bells ring. Smoke wafts your way. You stand perfectly still, breathing quickly, as others rush to play their favourite games of chance. The feel of fresh currency urges you forward. It's your turn to buy a network operating system (NOS).

Choosing a NOS can seem like part blind luck, part mysticism – just like the feeling when you step into a casino. The sights, sounds and smells overwhelm the neophyte, while those with seasoned senses stride purposefully toward the familiar. The NOS newcomer must learn the rules of each network offering and discover which vendor requires the steep ante, which game is most likely to pay off at high odds, and which best suits the situation.

NOS gamblers come in different sizes, statures and preferences. Whether you've just decided to move up into the server-based networking realm or you've been there for a while and you're shopping for a new 'game', you've come to the right place. We've focused here on seven NOSs that support multiple dedicated-server configurations: some just do the basics, but do them well, and some offer the capacity to grow into connection platforms for large enterprises with thousands of clients. Concentrating on mainstream, PC-based NOSs, we evaluated Microsoft LAN Manager, Version 2.2, and Microsoft Windows NT with Advanced Server; Novell NetWare, Versions 2.2 and 4.0; IBM's OS/2 LAN Server, Version 3.0; and Banyan Systems' VINES, Version 5.52(5). (Digital Equipment's Pathworks was in major revision, and as we were going to press, Novell NetWare 3.11 was superseded by NetWare 3.12. We were unable to review NetWare 3.12 due to time constraints.)

The basic server-client model on which all of these packages are based simply works. You could say this is the 90s version of the mainframe-dumb terminal model — but all jazzed up with 486 clients and servers that are far more manageable (and affordable) than their predecessors. Even many peer-to-peer LANs gravitate to a dedicated server arrangement fairly quickly (in traditional peer-to-peer, each machine can be a server). The biggest problem with peer-to-peer LANs is that they sit on top of DOS, using precious memory. Most organisations end up dedicating a machine to file service to ensure resource availability. True peer-to-peer LANs make sense for very small groups of fairly autonomous workers.

The requirements of a NOS player looking for a multiserver solution range from those of a small workgroup to those of a worldwide enterprise. Administrators with small needs who project little or no growth can just pick one of the market leaders without concern for long-term objectives and get running with good odds for beginner's luck. But one thing you discover quickly when you start connecting PC users is that *networks tend to grow.* Thus, we looked at expansion capabilities among the packages from the position of the folks who have to make it happen: the LAN administrators.

What's at stake

Most businesses will choose among these offerings with consideration for many elements in their decision matrix. If, for example, your company's offices are in one location, NetWare 3.11 (and the new feature-rich 3.12) provides good performance, depending on your applications. A geographically dispersed company, on the other hand, with many distributed small or large groups would be better served by VINES or NetWare 4.0, which excel by providing distributed naming and directory services, routing within file servers, and better wide-area network support. If your office is not too big and you have a heavy Mac-DOS mix, Advanced Server is a good bet (especially at its introductory price).

Your existing equipment can also steer you to the appropriate solution. If you need to run your server on an AT-class 286 machine, then look to LAN Manager or NetWare 2.2. These two are the only NOSs here that will run on a 286 platform.

We reviewed each NOS from the perspective of a LAN administrator. What do each vendor and product deliver to help with the weighty, complex task of installing, managing and maintaining a mission-critical network? In our testing, we followed this growth scheme by installing a first server, then expanding to a two-server environment, then adding a third server across a local bridge (see 'What the numbers mean' on page 141).

In our reviewing, we found LAN Manager and NetWare 2.2 at the bottom of the stack in our benchmark tests and features lists. These packages are both showing their age. Unless you need a 286 solution, neither of these two makes sense for a new LAN installation.

Although not reviewed because it has just been superseded by NetWare 3.12, NetWare 3.11 remains a stable, efficient, reasonably priced NOS for medium-sized networks — although it lacks an integrated naming service (which allows you to log on once to the network rather than to each server). All things considered, this product makes the most sense today as a general-purpose file server with DOS, Windows, Macintosh and Unix NFS support, and its new upgrade, NetWare 3.12, builds in new performance and ease-of-use enhancements. A review of NetWare 3.12 will be included in a forthcoming issue of *APC.* If

HIGHLIGHTS

Network operating systems

Network operating system software has come a long way since the days when you had to worry about which topologies each package supported. Today we see that some of the early entrants in the field are showing their age; others have grown into strong, reliable packages, and some of the newer, more complex packages are still maturing.

A NOS is a complex piece of software to begin with, but it should communicate its power, flexibility and capability through a clear, consistent interface and documentation. A NOS should be reliable and provide good management utilities and security.

Networks tend to grow. You start out with a few key people connected, then everybody wants in, then you get email, then you acquire another company or your business changes in some way. Unless you're absolutely certain your network will remain as it is, you should choose a NOS that is likely to grow with your networking needs.

Before choosing a NOS, you need to figure out more than simply what kind of clients and resources you need to support. Are you sure that you'll only be sharing files and printers? Is good Mac support critical? Do you need multiple protocol support on a single server? Is support for huge client/server databases a must? What about wide-area connectivity, C2-level security, and a global naming and directory service? How important is server fault tolerance? Will your company be investing in servers with multiple processors? Will Windows NT be on most of the desktops in your firm in a year?

This roundup encompasses a range of NOS solutions — from LAN Manager and NetWare 2.2, either of which will still run on an AT-class machine; to OS/2 LAN Server, with power but a questionable interface; to the undeniable VINES, with its stellar StreetTalk directory services; and finally to the new NOSs on the block: NetWare 4.0 and Microsoft Windows NT with Advanced Server, two very different networking solutions.

NetWare 4.0 delivers a hierarchical directory service and advanced server management features. Advanced Server, with its out-of-the-box capability for symmetrical multi- processing and great support for the client/server data model, also meets the needs of many networking sites and builds on the strength of Windows on the desktop.

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Suitability to task: Network operating systems

Undoubtedly the biggest piece of good fortune that can be visited upon you in the NOS game comes as you choose the right operating system for your business. If you choose well, taking into account what you know of the vendors' 'house rules' and the odds, you'll be a great deal more likely to win in the end with an effective network full of happy users. We assessed these NOSs from the perspective of an administrator for their suitability to the task of servicing four increasingly complex networking sites. Now let's lay the cards on the table.

A **small network,** for comparison here, was considered to be one with 50 or fewer clients. Typically, the users do lots of sharing and printing of files, so those services should be well executed. Ease of installation and configuration is important, as the site is more than likely to be a small business without a lot of capital to spend on the network itself, let alone a consultant to install it. This is often the first network installation for the LAN installer/administrator, perhaps with no training; thus, a clear, consistent interface and good documentation are key criteria. The cost of installing a NOS at this level must be defensible. Therefore, for small networks we weighted price as 40 per cent of the purchase decision.

A **medium network,** estimated here at upwards of 100 users, is probably slightly less price-sensitive than a small network. Here, we allotted 35 per cent to price in our purchase-decision weightings. Like a small network, such an installation requires file and print services, but these are even more likely to be spread across multiple servers. A site this size might also need support for Macintoshes, which are likely to be sprinkled in — and for the inevitable email.

A **medium to large network,** with perhaps between 100 and 150 users, has probably got a mix of local and remote sites to be connected. The administrator will be looking for all of the above features, plus probably some remote services for clients and some capacity for multiserver management out of the office. Pricing becomes less important as a determining factor than features, functionality and performance (we reduced it to 30 per cent of our weighting here).

Product name	SUITABILITY TO TASK
Small network	POOR
Medium network	FAIR
Medium to large network	GOOD
Large enterprise network	EXCELLENT

A **large enterprise network** can span dozens or even hundreds of sites. Here, naming and directory services become crucial to maintaining the network. Sophisticated network management is typically employed — probably as support for SNMP — along with huge client/server applications situated on high-performance servers. A network of this type is very likely to need Unix support — for workstations or management consoles. With anywhere from 150 to thousands of users, sites installing a large enterprise network can enjoy quantity pricing. And, in addition, bigger businesses tend to have more to spend. Price as a factor is down to 25 per cent here, with reliability, wide-area functionality and management features the big winners.

you've already got a NetWare 3.11 installation that's running well you can migrate seamlessly to NetWare 3.12.

If you want an integrated global directory service, Banyan offers a solution in its Enterprise Naming Service (ENS). ENS essentially delivers Banyan's venerable StreetTalk directory services to NetWare 3.11 (and 2.2) networks.

LAN Server seems to be IBM's latest solution for networking and makes sense if you like OS/2 2.*x*. IBM, however, also continues to market NetWare in non-OS/2 shops. IBM added Macintosh support to its latest release and recently included the option of NetWare or OS/2 on the same server.

Microsoft's Advanced Server looks like it will work well as a high-end multi-CPU applications server for networks that are built with a predominantly client/server architecture. It also makes great sense for mixed DOS-Macintosh shops. Lack of NFS for Unix workstations keeps Advanced Server out of the general file-server category support for the many shops that support Unix. Support for Windows for Workgroups, LAN Manager, and other Windows NT workstations keeps the promise of Windows everywhere alive. This first-version product certainly merits watching.

Banyan's VINES, known for its StreetTalk directory services, is a strong distributed product that has long been aimed at networks requiring global, wide-area connectivity. Its performance sometimes suffers from its Unix underpinnings, but its administrative tools are very good, and Banyan itself is becoming more responsive to its customers. Banyan's ENS may bring a unifying StreetTalk umbrella to mixed NOS shops.

NetWare 4.0 is a first-version product to watch. Already, fixes are out for the new distributed NetWare Directory Services (NDS) in the 4.01 code. The other features that NetWare 4.0 brings to the table — automatic file compression and file migration (which both automate facilities for server-resources management), support for 1000 network connections, and Windows-based management tools — may prove hard to resist, especially for first-time buyers. Veteran NetWare 3.*x* users should watch 4.*x* as it matures to stability.

NetWare 4.0 is a first-version product to watch. Already, fixes are out for the new distributed NetWare Directory Services (NDS) in the 4.01 code.

So which game will you play? The odds of a NOS's acceptance are set at the first installation. Any trouble at this point to produce winnings in the form of a working server within a reasonable time can discourage the installer from continuing with the same game. Moreover, installing a NOS involves more than just getting a server running. Prospective buyers need a vendor that supports the existing investment in client desktop, interconnect and server equipment, and that addresses other considerations as well.

Routers, bridges and gateways are considerable capital investments, and interoperability with these is important. If you're tired of swapping dozens of floppy disks at installation and of flipping through endless documentation, look to Advanced Server or NetWare 4.0, which both ship on CD-ROM, with all documents online and searchable.

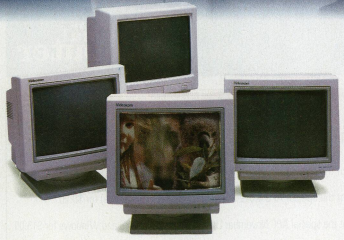
Binding networking protocols to network adaptor cards remains a critical function that must work to create a viable server. NetWare 2.2 continues to require a complete recompile of the OS to perform work at this level. NetWare 3.11 (and 3.12) and NetWare 4.0 allow dynamic binding and unbinding of protocols at the system console without bringing the server down.

Other NOSs require an installation procedure and a reboot of the server to make binding changes take effect (most corporate users perform these procedures in

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Glossary of NOS terms

API (application program interface) Any standardised set of software interrupts, calls and data formats used to initiate network services.

Bindery A NetWare 2.*x*/3.*x* database that holds data about various network elements.

domain A jurisdiction of servers and clients controlled and managed by a single server.

driver A layer of software, conforming to an API, that interfaces between the LAN software and the hardware on the network interface card.

IP (Internet Protocol) A communications protocol for networks using Microsoft LAN Manager, NetWare or VINES. IP software tracks the addresses of nodes, routes outgoing messages, and recognises incoming messages.

IPX (Internet Packet Exchange) NetWare's native LAN communications protocol, used to move data between server and/or workstation programs running on different nodes.

Named Pipes A communications channel used by applications on Microsoft LAN Manager networks.

NCP (NetWare Core Protocol) NetWare's format for requesting and replying to requests for file and print services.

NDIS (Network Driver Interface Specification) An API developed by Microsoft and 3Com and used by LAN Manager and VINES for LAN adaptor drivers. NDIS helps different operating systems and adaptors to work together and provides a way to use multiple protocol stacks in the same host.

NetBEUI (NetBIOS Extended User Interface) Microsoft's extension to NetBIOS. NetBEUI is used by LAN Manager, Windows for Workgroups and Windows NT.

NetBIOS (Network Basic Input/Output System) A specification to link a network operating system with specific hardware. Similar on some layers to IP and IPX. Some vendors use their own implementations of NetBIOS.

NLMs (NetWare Loadable Modules) Applications and drivers that run on a NetWare server and can be loaded or unloaded on the fly.

ODI (Open Datalink Interface) An API developed by Novell for LAN adaptor drivers. ODI makes it easy to use a NOS with various LAN adaptors and lets you use multiple protocol stacks in the same host.

protocol A specification that describes the rules and procedures that products should follow to perform activities on a network. Protocols enable products from different vendors to communicate on the same network.

SMB (Server Message Block) A formatted message used to request and reply to requests for file and print services in network systems.

TCP/IP (Transmission Control Protocol/Internet Protocol) A set of communications protocols originally developed by the US Department of Defense. It is available for many different computers, providing excellent interoperability across networks.

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off-hours). Advanced Server makes the job pleasant with its visual 'light bulbs' in the services dialogue box.

Once the file server attaches to the LAN, the installer then creates applications directories, user accounts and printing resources. This process can be complicated by the directory services implicit within the OS. Flat directory structures such as those with VINES or Advanced Server make it easier, whereas the hierarchical design and restrictive file-level rights inherent to NetWare 4.0 require a good understanding of an enterprise's directory structure. A LAN installer also must understand the underlying OS to perform these steps appropriately, because file rights vary with each NOS, as do the rights implied by hierarchical directory structures.

If you prefer a graphical interface, those built into Advanced Server and NetWare 4.0 could make installation easier. However, a consistent character-based interface (such as NetWare's C-Worthy) works equally well. Moreover, a good interface does make a difference: the power and flexibility of LAN Server is at times obscured by its unclear or inconsistent interface and documentation.

Supporting your clientele

Most companies maintain a heterogeneous mix of client systems, including DOS, Windows, Macintosh, OS/2, Windows NT and Unix workstations. In today's environment, a homogeneous NOS serves as the unifying agent. Transparent access to server resources provides the best support for clients. Network printers, for example, should appear in the same places as local printers.

Shared network volumes should also appear as if by magic as extensions to the local client. All the NOSs reviewed do this well for DOS, Windows, OS/2 and Macintosh clients. NetWare 4.0 also excel at providing transparent Unix and Open Systems Interconnection (OSI) access through additional file systems — FTAM (File Transfer and Access Method) modules.

Getting a single PC client to talk to several NOS servers requires the client to support multiple simultaneous communications protocols. Three different methods are available on DOS and Windows machines. IBM, Microsoft and Banyan favour the Network Device Interface Specification (NDIS) drivers, whereas Novell supports its own Open Datalink Interconnect (ODI) specification. A third alternative is the Crynwr (formerly Clarkson) packet-driver specification. Server communications protocols rest atop these device drivers, enabling further client code to provide the image of DOS file and print services.

File and print services derive from a client's native OS, whereas communications transport protocols are determined by specific hosts. Some file services and their native OSs include FAT (DOS), HPFS (OS/2), NTFS (NT), NFS (Unix), and AFP (Macintosh). Protocols required by host OSs include NetBEUI for LAN Server, LAN Manager and Advanced Server; IPX/SPX for NetWare; and TCP/IP for VINES and Unix.

Running the thing

The cost of hardware and NOS software remains but a small portion of the life-cycle costs of a network. Other expense items include administering user accounts; adding, moving and deleting clients; maintaining the LAN infrastructure; upgrading servers; and training.

Most NOS vendors leave the client and

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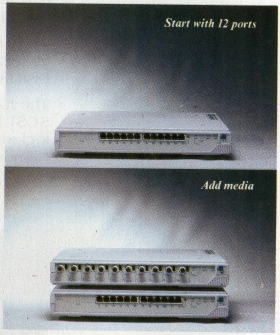
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LAN infrastructure management to third parties. However, as the Simple Network Management Protocol (SNMP) garners increasing support, most NOS vendors will include SNMP alarm reporting. Traditionally, SNMP clients only talked to intelligent hubs, bridges and routers; adding the server to the mix decreases the number of management consoles involved in tracking the network.

A server-management console should, at the very least, give the administrator a peek at memory-pool usage, disk utilisation, CPU utilisation and communications packet traffic. Advanced Server uses the NT Performance Monitor to track and chart these events in realtime. Unfortunately, no direct comparison can be made across NOS vendors regarding utilisation since each uses different algorithms for reporting these statistics.

See the sidebar on Digital's new Pathworks 5.0 client module, which offers a glimpse at unifying a networking console by providing a universal NOS manager. This module allows you to manage all of your servers from the same machine, regardless of what NOS is set up on the server.

All of the reviewed NOSs support log-on passwords with varying levels of user identification and password security to authenticate and grant access rights to shared server resources. With both Windows NT and Advanced Server, Microsoft offers C2-level security capability, as does Novell with NetWare 4.0 as defined by the US National Computer Security Center. This US standard is quickly being accepted here in Australia. Novell also supports this important security addition under its UnixWare product.

Never down and out

No casino makes money when the lights go out. Likewise, NOSs must run continuously, with minimal disruption, to keep users online and productive.

Hardware manufacturers have taken some of the burden off NOS vendors with fault-tolerant, hot-swapping drive arrays; automatic backups with tape autoloaders; and intelligent uninterruptable power supplies.

Novell heralds its System Fault Tolerance (SFT) levels I, II, and III as the utmost in system reliability. Level I included disk mirroring and level II provides for disk duplexing, but level III delivers full server redundancy (in which duplicate servers remain synchronised). No other NOS vendor provides for a hot server cut-over. If you need non-stop networking, NetWare 3.11 and 3.12 SFT III (and eventually 4.0 SFT III) provide your only solution. In fact, several peripheral benefits have emerged from SFT III for networks, such as the ability to schedule preventive maintenance on servers during normal business hours and to perform upgrades on the fly. Microsoft's Advanced Server has striping compliant with RAID levels 1 and 5.

At the simplest level, a fault-tolerant solution requires a complete system backup to tape for recovery from disasters or system failures. LAN Manager and LAN Server use OS/2 backup tools for this process that must support the High Performance File System (HPFS). VINES requires a backup at the file server to fully support a restore of system-critical files; many consider this a continuing deficiency. Advanced Server, the NetWare product, and VINES all include a basic backup utility.

hub, a *hub*, and a hub.



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2.



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The tempo

How fast does it go? When you're losing at the tables, very fast! Benchmark testing continues to play a role in providing decision makers with numbers to gauge the performance they might see. In PC Labs' benchmark testing of file transfers, NetWare 4.0 captured top honours for local client transfers, with LAN Server coming second. Note, however, that many factors affect the performance on your individual network.

Not surprisingly, the 32-bit packages were stronger performers, because they could address more than 16M of RAM, thus increasing disk cache. NOSs that offered internal packet routing fared poorly when performing that function. Using external routers would improve their performance considerably. Only consider internal routing for providing multiserver wide-area connection flexibility while controlling costs.

Certain protocols perform well on LANs but scale poorly when moving to WANs through remote links and dedicated or switched communications circuits. NetWare's IPX/SPX protocols performed poorly in the past through WAN links, but Novell developments for large frame sizes and packet burst now enable them to work well through WAN links. LAN Manager, LAN Server, and Advanced Server use NetBEUI as the local transport protocol, but NetBEUI is an unroutable protocol and can only be bridged. Advanced Server solves this by also supporting TCP/IP. VINES and other Unix derivatives also use TCP/IP for efficient WAN links.

Changing your luck?

Changing your seat at a table in a casino is fairly easy and sometimes seems to change your luck. As a user though, your luck doesn't always hold when you're trying to browse lists of network resources. Directory services are an important part of the decision matrix for companies just looking for an easy way to find resources that reside on their extended networks — or for the many companies that are moving to the international X.500 directory standard (which works with the established X.400 addressing services).

Novell modelled NetWare 4.0's NDS closely after the X.400/X.500 email addressing specifications and directory services. If you need the 'X standard' today — which you may if you have international connections or your network is large and spread out — NetWare 4.0 gets you closest at this point. However, more vendors are heading toward X.400/X.500.

If directory services only helped find networking resources, they would pay their way. Most savvy networkers, though, look to directory services to bridge user names to their email systems. We can imagine the day when a single user identification added to the network automatically appears within the email system. VINES, by the way, makes this dream a reality today.

Any sufficiently advanced NOS server will support the client transport protocols required to accept client access as an applications server.

Fortuitous connections

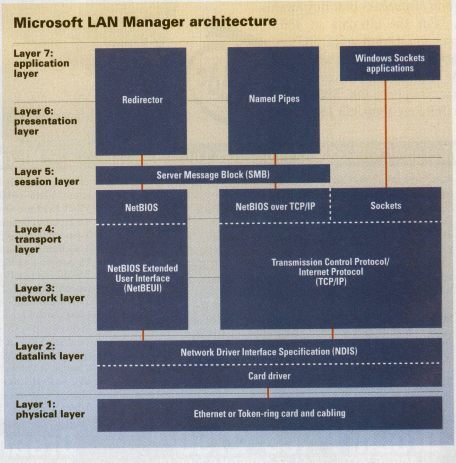
Any sufficiently advanced NOS server will support the client transport protocols required to accept client access as an applications server. This, however, takes a higher-level protocol that maintains a connection-oriented channel to let clients talk to NOS servers. OS/2 Named Pipes and remote procedure calls (RPCs) in the Unix environment serve this function.

All of these packages support standard transport protocols for access to a server from native client OSs for DOS, OS/2, Unix and Macintosh. How each NOS works with each application server depends on the application's ability to exploit underlying NOS services. As NOS vendors move to support the Open Software Foundation/Distributed Computing Environment (OSF/DCE) protocols for RPCs, reliance on the underlying NOS will become irrelevant.

Scaling up

Success breeds success. When a casino reaches capacity, it builds an addition to accommodate increased demand. In the same way, NOS buyers want their networking solutions to grow as their demands increase. A simple file and print server today may become an integrated application server in the future.

Again, hardware vendors implement many of the scalable features that a NOS



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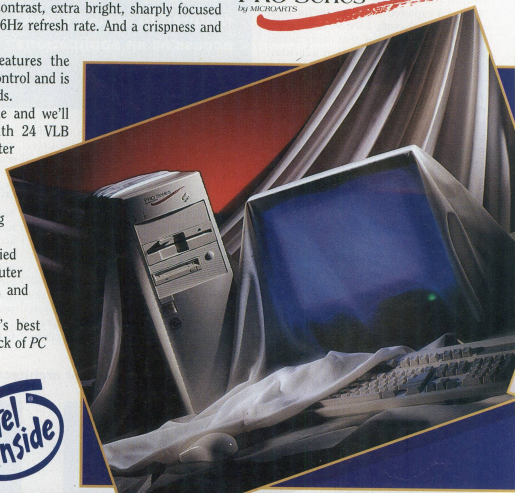
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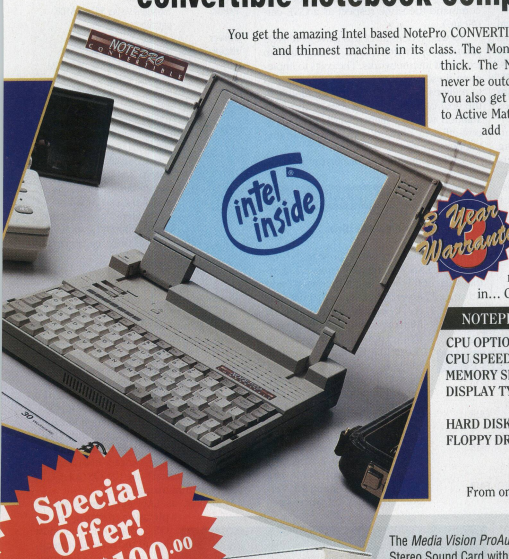
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needs in order to grow. Three main subsystems must be scalable to continue growing a server. Disk subsystems must be able to increase in size, server memory must be able to expand to cover applications, and disk cache and more CPUs must be addable to support CPU-bound applications servers.

Within the OSs, support for large logical volumes that span several physical disks becomes a necessity for large client/server databases that include multigigabyte files. Server memory should support full CPU capacities, but hardware vendors seldom implement the gigabyte memory sizes available to CPUs.

Today Advanced Server, Unix and VINES offer symmetric multiprocessing (SMP) options, which allow LAN managers to add CPUs to improve performance. Novell supports asymmetric multiprocessing (AMP), in which applications servers or network adaptor cards can offload the main CPU. For regular file and print services, which remain I/O bound, additional CPUs offer little in performance gains. Only CPU-bound processes will benefit from SMP.

The ambiance factor

Vendor reputation, stability, market share, third-party support, training, certification, VARs and VADs: a reputation for higher payoffs invariably draws crowds to gaming establishments. NOS vendor reputations and peripheral support influence buyers' decisions.

Novell still holds (depending on which research you quote) some 55 to 75 per cent of the network market. NetWare 3.11 is a stable, scalable NOS architecture — but equally as powerful is its tremendous third-party support.

Microsoft owns the desktop with Windows 3.1 shipping in higher volumes than any competitor. Windows NT extends the Windows metaphor to high-end workstations, and Advanced Server comes out as a competitive NOS.

Banyan's reputation for delivering an excellent wide-area distributed solution in VINES remains untarnished. Performance and scalability remain problems, but the company's emphasis on ENS across multiple platforms may yet endear it to the masses.

IBM's standing as a NOS vendor in the minds of end users continues to be questionable: LAN Server, based on OS/2 2.1, fares quite well in a feature and function comparison, but loses serious points for its ease-of-use problems.

Prospective NOS buyers also need training, support, and reliable service from third-party organisations. Novell's Certified NetWare Engineer (CNE) program has taken on a life of its own, and Novell training programs, books and tapes abound. Microsoft offers its own Certified Professional Program (but it doesn't currently command the same respect as a CNE certificate).

So where does all of this leave you? NOS solutions span from small workgroups to extended internetworks. The costs to implement these solutions range from thousands to millions of dollars. Careful planning with the goal of implementing a single vendor's solution will pay high rewards in a stable cost-efficient network capable of carrying your enterprise into the future.

LAN administrators, place your bets.

Microsoft LAN Manager	SUITABILITY TO TASK
Small network	FAIR
Medium network	FAIR
Medium to large network	FAIR
Large enterprise network	FAIR

Microsoft LAN Manager

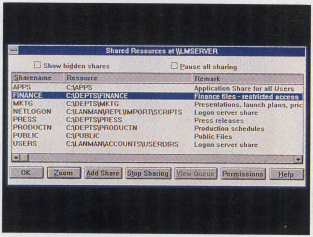
By Ken Mackin

It's really tough to know how to bet on Microsoft LAN Manager, Version 2.2, now that Microsoft is shipping Windows NT and Advanced Server. Microsoft says it intends to keep supporting LAN Manager as long as there is a market demand. It would make sense that having set the ante for its vision of future networking with Windows NT and Advanced Server, changes could come to LAN Manager that would make it as compliant as possible with the two.

In this review, we looked at LAN Manager 2.2 and discovered that not a lot has changed since Version 2.1. Version 2.2 relies on Microsoft's not-yet-gone, wish-we-could-forget-it OS/2 1.3, the latest *Microsoft* version. OS/2 1.3 is a 16-bit operating system (OS), but as some portions of LAN Manager are 32-bit, it requires a 386 or higher. The 32-bit features, such as the HPFS and NetBEUI, run on top of the 16-bit OS/2. In addition, OS/2 1.3 uses a version of Presentation Manager (PM) that is weak compared with IBM's current version. Although it sits on top of OS/2, LAN Manager is not a PM-based architecture; it doesn't use the OS/2 1.3 GUI except for print management.

Moreover, as LAN Manager is an application running on an OS/2 platform, you must install and tune *two* operating systems. Sometimes this setup causes trouble. For example, if you log-on to the network as ADMIN (administrator), run the NETADMIN utility, and then exit the program, you are returned to a Presentation Manager desktop. Trouble is, you're still logged on as ADMIN and anyone can sit down and rerun NETADMIN without reconfirming the password. This is the kind of situation that can result from having to run two OSs to accomplish one set of tasks.

LAN Manager and its



Microsoft LAN Manager lets administrators control and assign network resources across multiple servers from a single console

AT A GLANCE

Microsoft LAN Manager, Version 2.2

Distributor: Microsoft
Phone: 008 062 062
Price: Standard server $3100; $100 per client
Server requirements: 386-based PC or better, 5M RAM (8M recommended), 30M hard disk space.
In short: In spite of its use of a domain architecture, and its support for TCP/IP, SNMP, and multiple protocol stacks on an NIC, Microsoft LAN Manager is tough to recommend in this roundup. Weak administration tools, lacklustre performance, and the problems of maintaining two operating systems mark this version of LAN Manager as a NOS that might be past its prime.

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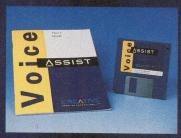
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cousins, most notably OS/2 LAN Server, are fundamentally different from the Novell architecture in which the OS and the NOS are one and the same. Microsoft and IBM have said that LAN Manager and LAN Server are not 'network operating systems' per se, but that they are applications providing network capabilities to standalone multitasking OSs.

Before you start a whole new game, remember that LAN Manager offers reasonable connectivity for a medium-sized LAN, and that numerous enterprise installations of several hundred machines exist. But LAN Manager's administration tools and implementation are weak compared with those of NetWare, VINES, or even LAN Server.

Still, you probably need a few good reasons to run a LAN Manager network. For instance, you've been running one for some time and it's working well, or you're using Microsoft SQL Server or Lotus Notes and want to stick with OS/2 1.3. Otherwise, another NOS would offer better tools and administration.

LAN Manager's domain architecture allows a single server or multiple servers to be defined as a single common jurisdiction.

Although LAN Manager never has sold very well in the United States (compared with NetWare), Microsoft did get a few crucial things right. First, LAN Manager does support TCP/IP (unlike LAN Server) and SNMP, as well as multiple protocol stacks on a network-interface card (NIC) and up to 12 NICs per server, compared with four for LAN Server.

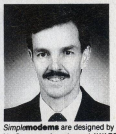
LAN Manager includes effective support for disk mirroring and duplexing, as well as uninterruptible power supply (UPS) monitoring, and a version of HPFS — it keeps the fat in RAM for better performance. Microsoft Windows for Workgroups and NetWare connectivity solutions are included in the package, but Mac client support is a separate purchase.

LAN Manager's domain architecture allows a single server or multiple servers to be defined as a single common jurisdiction. LAN Manager also includes support for

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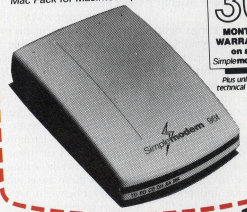
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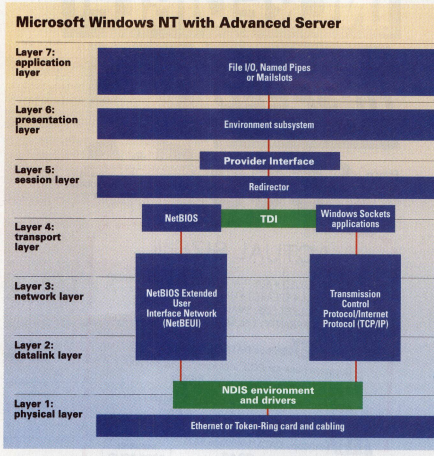
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'backup' domain controllers and 'additional' servers, which are usually found acting as database servers.

Microsoft got a few other things right besides the disk caching and file swapping. One very important feature, replicated throughout the LAN Manager universe of products, is the *alias* — a nickname that serves as a shortcut to a network resource.

This is a welcome extension to the cryptic .PRNs, .LPTs and .COMs of the DOS hieroglyphics. You simply set up your resource, create a name for it, and you've got an alias. Whenever users want to use it, they just refer to it by name. In addition to the communications device and printer aliases, the concept can also apply to a file or directory. The proper substitution of aliases for path and file names can save a lot of typing. This is a capability that should have been added to DOS a long time ago. It is not something that should be limited to networking environments.

In addition, LAN Manager supports *domains*, a concept that will be familiar to administrators of NetWare 4.0, VINES, and Unix OSs. LAN Manager supports 50 users per domain effectively — that's 50 users per server or set of servers, according to the documentation. (Microsoft says LAN Manager can support as many as 16,000 users per domain, but whether it can do so *effectively* is a question.) In contrast, OS/2 LAN Server can support as many as 1000 users per domain.

LAN Manager was the slowest of all the major NOSs tested in this roundup, turning in numbers comparable with NetWare 2.2's, and like 2.2 it has aged some. This is a five-year-old OS, and it shows in the performance.

It also shows in the tools, which run under DOS and OS/2 1.3 in text mode only. LAN Manager does beat out LAN Server in some respects — such as in the ability to 'clone' users and groups while setting up — but these areas are few and far between. LAN Manager gives you most of the tools you actually 'need' to network — through command lines, unfortunate though functional OS/2 text screens, and an outdated version of Presentation Manager. The online help is not truly context-sensitive and the documentation is dense, although it is more approachable than IBM's for LAN Server.

By itself, LAN Manager provides an outdated but still functional set of tools that deliver lacklustre performance, as tested here. It's probably not a good risk as a new purchase with some of the other NOS solutions now available, unless you have a special need for it.

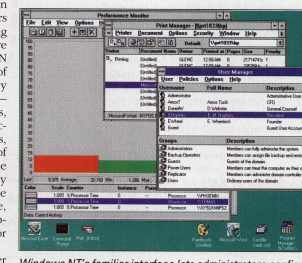
Microsoft Windows NT with Advanced Server

By Ken Mackin

After tipping its hand for months, Microsoft has finally laid its cards on the table introducing Windows NT with Advanced Server. It's an interesting hand, as you might expect — a few great cards, a few you might change if you could, but certainly playable.

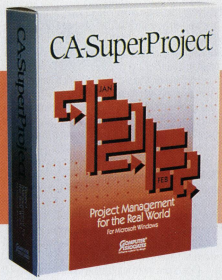
Microsoft has actually played two networking hands: Microsoft Windows NT is rather peer-to-peer, and Microsoft Windows NT with Advanced Server is a client/server solution. The peer Windows NT could be called 'Windows NT for Workgroups — with security'. It includes 32-bit recompiles of the Windows for Workgroups goodies, Microsoft Schedule+ and Microsoft Mail. Advanced Server is a hefty rewrite of much of LAN Manager. Here we reviewed Microsoft Windows NT along with Microsoft Windows NT with Advanced Server.

Advanced Server supports remote network installation; symmetric multiprocessing (Advanced Server supports four processors, NT two); RISC, including the MIPS R4000, and (possibly by the time this is in print) Digital's Alpha boxes; a scheme for centralised management; abandonment of .INI, CONFIG.SYS, and AUTOEXEC.BAT files; sophisticated user-profile management; network-based printing; built-in backup for LAN Manager 2.*x* and NT workstations, Windows for Workgroups computers, and Advanced Server systems.



Windows NT's familiar interface lets administrators configure users and user groups with little more than a few mouse clicks

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Banyan's ENS fills a global gap

BY DAVID LINTHICUM

Novell's release of NetWare 4.0 earlier this year brought a variety of features not included with earlier versions, the most significant of which was the NetWare Directory Service (NDS). NDS is a global distributed object database that tracks and maintains users, servers, printers and other network components. But its emulation of the Bindery notwithstanding, NDS's lack of support for older NetWare 2.*x* and 3.*x* networks leaves many NDS wannabees — who lack the budget for NetWare 4.0 — out in the cold.

Banyan Systems fills the void with Enterprise Network Services (ENS), an NDS-like product based on Banyan's popular StreetTalk Directory Service for VINES. Included in the $6640 price are StreetTalk Directory Assistance (STDA), the Banyan Security Service, Banyan Network Management, and, of course, support for IPX/SPX. Server modules are sold separately, and other options are available.

Administrators using ENS can add users, alter security parameters, manage electronic mail services, and dynamically move files and devices across existing NetWare 2.*x* and 3.*x* file servers that are connected to local or wide area networks. As with NDS, as changes occur using ENS, they are automatically distributed across the servers, centralising and simplifying server management.

ENS builds the global directory automatically from existing NetWare Binderies, converting the entries to StreetTalk names. Establishing ENS at the server requires either an NLM for NetWare 3.*x* or a VAP (value-added process) with a licence key for NetWare 2.*x*.

Chasing NetWare 4.0

In addition to support for older NetWare networks, the newest release of ENS, Version 2.0, supports NetWare 4.0. This could prompt some administrators to abandon plans to upgrade to NetWare 4.0 as they find it easier (and cheaper) to maintain 'older' versions of NetWare.

One of the more interesting features of ENS 2.0 is the dual redirector, which enables NetWare and VINES servers to share files, thus eliminating a major drawback for organisations with a mixture of Banyan and NetWare servers. Also included is a gateway option that enables NetWare users to connect to mainframes using 3270 emulation, and new support for Macintosh clients.

When, where and why

Generally, if you're sold on the functionality of NetWare 4.0, and upgrading all of your servers is just a matter of time, then NDS is the way to go. It replaces the NetWare 2.*x* and 3.*x* Binderies, it's an effective directory service, and it is closely tied to the CCITT X.500 standard.

If your organisation has the normal hodgepodge of servers and operating systems, then ENS is for you. ENS is based on a global management of diverse and distributed servers. For many companies, ENS is invaluable. Banyan's future plans for ENS are interesting as well. In 1994, it plans to release a new version of ENS that will support Windows NT.

ENS has given new life to older NetWare servers and networks. ENS enables NetWare users to purchase just what they need, when they need it — without having to commit to Version 4.0 to obtain a single desired feature: a global directory.

Microsoft says that Advanced Server is not an NOS, but it does have direct access to the NT kernel and acts as part of the kernel. This could be responsible for a slower than expected performance. We observed no significant performance differences, no matter which of the three available memory models was chosen. In our testing, Advanced Server fared only slightly better than LAN Manager. But speed is only one issue among many.

What are the benefits for administrators and users in the new NOS? Some good ones are centralised control and management of users and local or global groups, by way of a consistent, familiar-looking, and mostly friendly interface, and excellent support for Macintosh environments.

Microsoft does come out of the gate with C2 security capability, but other aspects of its security had a few quirks. It was broken up into user, group, file, volume and MACFile security. There is no security object here, only security as an element of other objects, and the controls for it are spread throughout Advanced Server's tools. One major and nearly undocumented factor in the Advanced Server security scheme is this: if you give a user Full Control of a directory, or volume, he or she has complete control, even if a file in that controlled directory is set off-limits. Only a true administrator should be able to override individual file security.

Microsoft Windows NT with Advanced Server

SUITABILITY TO TASK	
Small network	GOOD
Medium network	GOOD
Medium to large network	GOOD
Large enterprise network	GOOD

The installation is easier than NetWare's and LAN Server's. The program supports many card types automatically — Microsoft has done an exceptional job with its detection products, sensing Intel, 3Com and Novell cards effortlessly. Using the CD-ROM and a floppy disk, the installation stops only to ask you a few important questions.

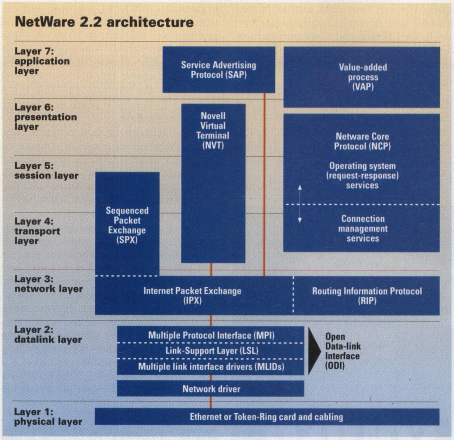
Windows NT Servers are grouped in domains that are 'managed' by a domain controller, which keeps everything synchronised in the group — exactly as LAN Manager and LAN Server work. Backup domain controllers exist just in case the main one dies.

The domain structure of LAN Manager, replicated in Advanced Server and LAN Server, is a problem for companies that are

AT A GLANCE

Microsoft Windows NT with Advanced Server

Distributor: Microsoft
Phone: 008 062 062
Price: $2350 till December 31. $4695 after that.
Server requirements: 386DX/25-based PC or better, (also runs on RISC-based systems), 16M RAM, 100M hard disk space.
In short: This OS supports symmetrical multiprocessing, global directory services, and centralised management of users and groups; it offers excellent Mac support. Its performance lagged, and Microsoft was addressing significant problems with drivers. This product will eventually be a viable choice, with an easy installation and sophisticated storage technology.



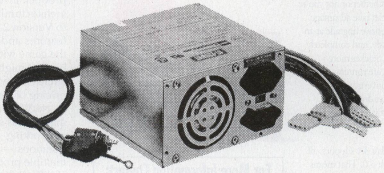
moving to enterprise-wide connectivity. Though domains can establish trusted relationships with other domains under Advanced Server, the structure of the network cannot reflect or respond to the changing organisation well.

The addition of trusted relationships certainly makes it easier to manage complex environments, but a trusted relationship with another domain is a modest response to a big problem. It means that you can avoid replicating users on different servers. But once you set up your overall domains, any changes you make — renaming a domain or adding servers — means rebuilding your network.

But none of these products addresses this issue. Only VINES comes close with flat-file StreetTalk databases, which allow you to make a change and see it reflected across the network. But VINES stores security on the local machine where your account was created, making that the only server that can authenticate. At least Advanced Server will copy authentication data to the backup domain controllers, enabling log-ons even if the main domain controller is down.

Global and local groups are also part of Advanced Server. A global group can contain any user local to the domain with access to resources on other domains. The

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local group can contain any trusted user or global group with access to a local resource. Keep in mind that local and global refer to resource availability, not users.

Advanced Server disk I/O has several important features. One is a disk-management scheme that allows users to disk mirror, disk duplex and data stripe. With many vendors now selling 'software-only' RAID solutions, Microsoft's support of so-called RAID 0, RAID 1 and RAID 5 is not surprising, but data striping and RAID support above level 1 are emerging storage techniques. You buy four disks instead of two, and still have fault tolerance only one level deep. LAN Server, the NetWare products, and LAN Manager allow for RAID 1 and duplexing, but stop short at striping and RAID 5.

Protocol support here is quite similar to that in previous offerings from Microsoft and IBM. NDIS is supported with TCP/IP and NetBEUI, as well as IPX/SPX. Notable here is AppleTalk support, and data-link control (DLC) for talking to network-based printers.

Some of the protocol support, IPX/SPX in particular (NWLink), appeared unstable in PC Labs testing. In follow-up testing, the problem was found to be more related to adaptor drivers and the binding of multiple protocols with multiple NICs. This is the kind of last-minute bug that probably will be fixed by the time you read this, but it caused considerable concern in a shipping product at the time.

The Macintosh support is noteworthy. Advanced Server supports Mac volumes for Mac users on an AppleTalk network, and PostScript printing for the AppleTalk clients. It even printed the AppleTalk PostScript jobs on an HP LaserJet III that had no PostScript onboard.

If you are a dedicated Microsoft networking customer and need better networking, Advanced Server is for you. Or you may want to add a new server and PostScript RIP to your AppleTalk network; it was a solid performer on the small AppleTalk network we used. If you are a Microsoft SQL Server user and want something better than OS/2 1.3 to run it on, give Advanced Server a shot. If you don't have big performance needs, it could work for you. The Microsoft player, Advanced Server, doesn't win all the chips, but it certainly can pay its own way in the NOS game.

results and reader feedback continue to suggest that DOS 6.0 DoubleSpace is causing significant problems on a wide variety of DOS machines.

– InfoWorld
May 10, 1993

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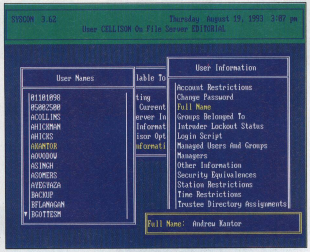
NetWare, Version 2.2

By Garry Frenkel

Like the ubiquitous dollar poker machines in a casino, the installed base of the NetWare 286 line still makes up the broadest portion of Novell's share of the network market.

But Novell says this predominance is changing, and NetWare 2.2, the pinnacle product in the line, is showing its age, architecturally and otherwise. It's a tribute to Version 2.2's design that its richness of features and dependability still keep it in the game with the newer 32-bit big-payoff boys. It might still be a solid bet in limited circles if it weren't for Novell's aggressive pricing of NetWare 3.11.

NetWare 2.2's feature fitness in today's market falls short when you start to list the networking issues that face today's corporations — management and support of multiple protocols, wide area connections, and flexibility and ease of use in managing the NOS under constantly changing network scenarios. It could not keep up in our benchmark testing when it came to tasks reflective of larger networking. This is understandable when you remember that NetWare 2.2 was developed during the era of the 286 and that the 16-bit 2.2 will still run on an AT-class machine. Understandable, yes, but not acceptable as an enterprise solution.



NetWare 2.2's C-Worthy interface allows LAN managers to choose user and other options from an expanding series of pop-up menus

The toughest hurdle for NetWare 2.2 today, though, must be the pricing and positioning of NetWare 3.11. A few years back, Novell responded to its smaller workgroup customers and addressed confusion in its 286 line by merging the various versions of NetWare 286 into one. NetWare 2.2 allowed a company that was just getting into LANs to start with an $1408 5-user version and grow from there.

NetWare 386 was initially released with only a single 250-user version, and even by the time NetWare 2.2 came out, the 'entry-level' NetWare 3.*x* version was a 20-user licence for over $4000. Today things are vastly different. A 5-user version of NetWare 3.12 now lists at $1775 compared with NetWare 2.2 at $1408. Is it worth $7 less per user for a company to invest in NetWare 2.2?

We noted the mix of old and new that is contained in an operating system caught between and across chip generations. Although NetWare 2.2's installation and configuration are much improved over those of its predecessors, our installation still required over an hour, plus a fair amount of disk shuffling. And, most painful, if you want to add your server to a WAN and need to change a network address or server name, or add a new network interface card, you must relink and recompile the operating system. With NetWare 3.11 or 4.0 this is accomplished with a few keystrokes.

NetWare 2.2's documentation is extremely well-written and organised and is replete with helpful screenshots. During installation, online help is available for each screen, as is the case with the rest of the NetWare utilities.

NetWare 2.2 is the ninth generation of the NetWare 286 line, a maturity evident in the administrative utilities for user and file management. Setting up users, establishing account permissions, and managing the directory structure are all handled by a series of well-designed, menu-driven and command-line utilities. It was not until NetWare 4.0, however, that Novell offered a global directory service as an inherent part of NetWare. Help for NetWare 2.2 comes from Banyan, in the form of Enterprise Network Services for NetWare (ENS), which essentially delivers a portion of Banyan's StreetTalk global naming service to NetWare networks (see the accompanying sidebar, 'Banyan's ENS fills a global gap'). NetWare 2.2 also lacks the remote console feature that can be found in NetWare3.12 and 4.0.

Architecturally, NetWare 2.2 is familiar, but dated. It does not have the multithreaded processing capabilities of NetWare 4.0, even though it can run server-based applications called value-added processes (VAPs). But VAPs are considered difficult to write and few are available.

On the other hand, the new NetWare 3.12, as does NetWare 3.11, has a myrid of server-based applications called NetWare Loadable Modules (NLMs) available, ranging from network management applications to SQL servers. Interestingly, the most notable VAP for NetWare 2.2 is the Macintosh VAP, which allows a NetWare 2.2 server to double as an AppleShare server and emulate a networked Apple

NetWare 2.2 SUITABILITY TO TASK

Small network	FAIR
Medium network	FAIR
Medium to large network	FAIR
Large enterprise network	POOR

AT A GLANCE

NetWare, Version 2.2

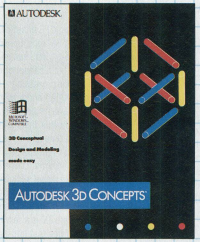
Distributor: Novell
Phone: (02) 413 3077
Price: 5 users, $1408; 100 users, $9819.

Server requirements: 286-based PC or better, 500K RAM (2.5M recommended).

In short: This 16-bit NOS can still run on a 286, but it cannot offer multithreaded processing capabilities, nor does it support wide-area connectivity or multiple protocols. Installation takes a lot of time and some disk shuffling. It might still be a good choice in limited circles but for the aggressive pricing of NetWare 3.11. Possibly the most interesting built-in capability of NetWare 2.2 is a server-based application that lets its server also act as a Macintosh AppleShare server.

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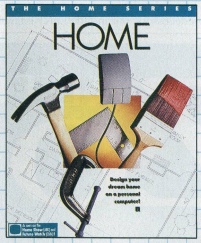
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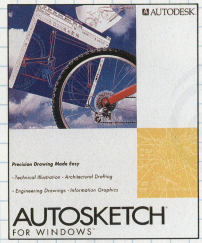


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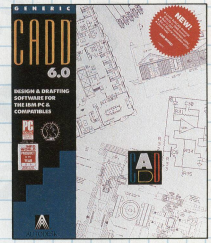


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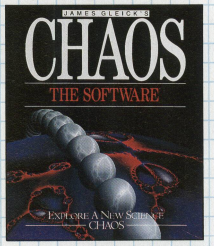
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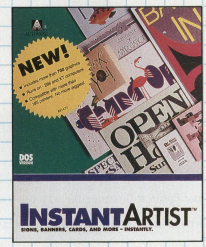
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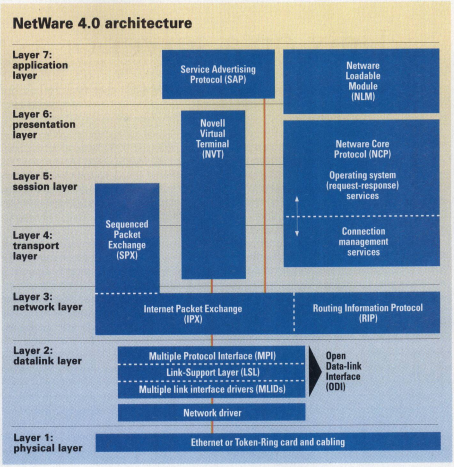
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LaserWriter printer. These Macintosh VAPs come standard with NetWare 2.2, whereas the Macintosh NLMs are a separate purchase for the newer versions of NetWare. Thus, a small Mac-heavy office might find NetWare 2.2 a good deal. NetWare 2.2's server support for protocols other than IPX is limited to AppleTalk Filing Protocol (AFP).

On the client side, NetWare 2.2 uses the same drivers as NetWare 4.0 (and NetWare 3.11 and 3.12). The client shells support NetBIOS and Named Pipes, and by using Novell's ODI drivers, a NetWare 2.2 workstation can concurrently support TCP/IP.

NetWare 2.2 offers competitive fault tolerance, security and print services. Where it cannot compete is in advanced features, such as server memory and server storage. Its maximum server memory is 12M. NetWare 2.2's maximum volume size is 255M, and volumes cannot be split across multiple disks.

With the NetWare 2.*x* family still the most widely installed version of NetWare, Novell should do its users a favour and offer an upgrade trade-in program that is too good to be passed up. As it is, NetWare 2.2 offers firepower sufficient for a single-server network. But if you want better performance, or if you might ever need to support multiple protocols or multiple networks, then place your bets somewhere else.



NetWare, Version 4.0

By Padraic Boyle

With the challenges of global networking continually upping the stakes for the high-end rollers in the NOS game, Novell plays a strong hand with NetWare 4.0, which offers simplified multiserver log-on, resource sharing, and centralised management in a feature-rich, coherent package. In addition, NetWare 4.0's benchmark test scores were good for an NOS so loaded with functionality. But the ante is high: Anticipate a learning curve with NetWare 4.0 for some of its important new elements, be prepared to do a lot of network planning up front, and check your budget.

NetWare 4.0 is not for everyone. Whether you really need such a powerful NOS depends upon the size, configuration, and complexity of your LAN and — with a price tag of $2242 (5 users) to $79,908 (1000 users) — your budget. NetWare 4.0 adds many new features, building on the capabilities of NetWare 3.11 and 3.12. Some of the more attractive ones are the NetWare Directory Services (NDS), file compression, block suballocation, file migration, and Windows-based management.

NDS is at the nucleus of Net-

NetWare 4.0

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Unix on a server or as your NOS?

BY DAVID LINTHICUM

It may seem an interesting alternative to your usual game: Unix as your OS, with support for DOS networking. Unix brings some interesting capabilities to the table, but is it the NOS of choice for an organisation that supports only DOS and Microsoft Windows? Certainly not. Performance and cost are the two biggest reasons. Consider it only if you have a mix of DOS and Unix clients.

Okay, how about a Unix-based file server sitting on your NetWare or LAN Manager network? That's a fine consideration, again, when both DOS and Unix-based workstations are in the mix. You can create this Unix file-server solution on Intel or non-Intel processors using Unix with the proper networking software.

What Unix offers is an advanced operating system that can run on multiple hardware platforms, such as RISC, SPARC and Intel (Microsoft Windows NT with Advanced Server now delivers this also).

Of the many advantages Unix salespeople may cite to make a case for using Unix as a DOS file server, only a few are reasonable.

First, support of advanced chips means that some fairly fast hardware can be used for DOS file servers. Second, the built-in networking features of Unix allow its DOS clients to access other services not provided when conventional DOS NOSs are used. Finally, organisations with a mix of DOS and Unix clients may find servers that support the sharing of both DOS and Unix files more effective than the integration of separate DOS and Unix file servers.

The major disadvantage to the Unix file-server solution is cost. The DOS client software for Unix/DOS networks (such as those based on NFS) can cost $300 to $500 per DOS or Windows computer. At around $300 per user, a 50-workstation network can cost an organisation $15,000. And that's just for the DOS/Windows client software.

Performance is another problem. Unix is fast, but not when it is used for DOS file service. Unix was written as a general-purpose, multitasking OS. The Unix networking software that provides the DOS file sharing is just one of many tasks and network protocol stacks running on the server. It isn't possible to get the type of DOS file and printer service performance that is expected from conventional DOS file servers such as NetWare. NOSs such as NetWare were specifically designed to optimise file services and so contain related advanced features, such as support for delayed writing to disk (used to optimise file writes).

When you should consider Unix . .

Convenience in connectivity — not performance or economy — must be your goal if you're considering Unix. If file sharing is required in an organisation that supports both DOS and Unix, a Unix file server may be the solution.

. . And when you shouldn't

Some DOS and Windows-only organisations have been sold on the idea of a Unix-based computer as the file server of choice. The fact that Unix can run on advanced processors can be misleading. Many have believed that Unix on an advanced processor must be faster than a NOS running on the slower PC. Nothing could be further from the truth. A Unix-based file-server almost never makes good sense for DOS and Windows-only clients. Network performance goes down and the cost goes up — not a good bet.

Ware 4.0. Based on the X.500 'standard', NDS is a hierarchically designed database that replaces the Bindery in previous NetWare versions. All of the network's information is stored in the NDS. NDS views all network entities as objects, each of which is a pointer to a user, a group of users, print servers, or a server volume. With this move Novell does not leave behind Bindery users; NDS can emulate a Bindery, making it easier for sites that will upgrade one server at a time and have a mixed environment of 2.*x*, 3.*x*, and 4.*x* servers.

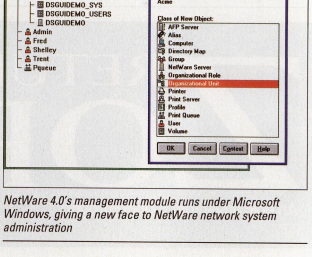
The real beauty of NDS is the fault tolerance it delivers. If the server that contains your information is down, NDS searches its database on the other servers to piece together your information and allow you to log-on to the network. This is possible because the NDS database is replicated across all servers in the network in partitions, which maintain all of the network's information. In contrast, Banyan's StreetTalk keeps a user's information on only one server: if that server goes down, so do you.

One of your first challenges with NetWare 4.0, though, is planning your directory tree structure, a most important part of providing a functional network.

Instead of multiple single servers that make up a network, there are multiple servers that are the network. Because each network is different, there is no set way to configure one, but once set, you cannot change the structure dynamically.

Block suballocation, file compression and file migration are some of the attractive features in Version 4.0. Block suballocation intervenes in a situation where, for example, a file that is, say, 2K large is stored on a server that has 4K blocks. Normally, the 2K of disk space is wasted, but with block suballocation turned on, that space would be used by other files to fill the rest of the block. Using a ratio of about 2:1, file compression also can make a big difference in your hard-disk storage space. File migration is a feature that has been offered in some tape backup packages. Novell has incorporated it, along with High Capacity Storage Systems (HCSS), in NetWare 4.0. HCSS allows you to set flags on files by date and move them off to other media. A phantom stub is left on the volumes so that if a user attempts to access the file, it is copied back over transparently.

With NetWare 4.0, Novell also adds Windows-based management software bringing in the old and new configuration features used in SYSCON, PCONSOLE and PRINTDEF. The GUI attributes make it easy to add, move, delete and modify network objects.



NetWare 4.0's management module runs under Microsoft Windows, giving a new face to NetWare network system administration

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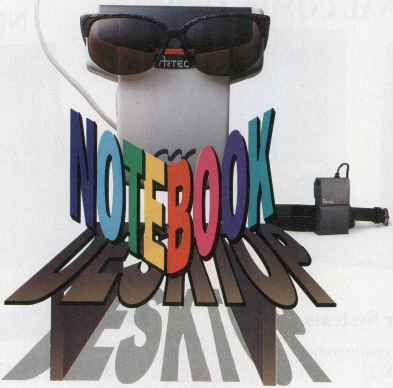


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AT A GLANCE

NetWare, Version 4.0

Distributor: Novell
Phone: (02) 413 3077
List price: 5 users, $2242; 1000 users, $79,908
Server requirements: 386-based PC or better, 6M RAM, 12M-60M hard disk space
In short: Novell seems focused on again setting a standard for NOSs in NetWare 4.0. It builds on all the best of NetWare 3.11 and adds superb fault tolerance, a global directory service, file migration and compression, and a Windows-based central management module. The restructured directory and other new capabilities mean a significant learning curve, and the price for all this power will tend to make it most attractive to managers of large, multiserver, distributed networks.

The server installation process under this new version is complete and simple, and is delivered under a totally menu-driven install procedure. A CD-ROM that contains all the install files means no disk swapping: after you install the first server, you copy all contents of the CD-ROM up to the server's volume so that additional servers are installed much more quickly over the network.

Novell has also overhauled the workstation shell, replacing two files, IPX and NETX, with modules. The Virtual Loadable Modules (VLMs), which offer a more flexible solution for the workstation, are loaded into memory by the VLM Manager.

The VLM Manager automatically takes advantage of available upper memory, conserving conventional memory. VLMs take up less conventional memory than their predecessors did, and with packet burst built-in, even less memory than BNETX (the net shell for burst-mode use on a workstation).

As they are modules, VLMs can be added or removed from a workstation simply. In addition to the new shells, better Windows support adds a graphical interface to ease the problems of attaching, logging out, mapping a drive and connecting to a print queue.

Upgrade ante

Three transfer routes are available for upgrading from NetWare 3.11: across-the-wire to a 4.0 server, across-the-wire on the same server, and in-place. Across-the-wire to a 4.0 server is the safest procedure, but could be the most expensive. A separate server must be brought up with NetWare 4.0 and put on the network. If you have a spare server lying around, you could leapfrog from server to server, upgrading each as you go.

Going across-the-wire on the same server involves some risk to data integrity. A client with either a large enough hard disk or tape backup system is needed to store the server's data temporarily while the server is being reconfigured for NetWare 4.0.

An in-place upgrade also involves some risk, mostly from a possible failure during the upgrade. Just make sure you have a complete backup of your network server before you begin this process. And note — this procedure is not available to NetWare 3.0 servers; you must first upgrade to NetWare 3.1 or higher.

NetWare 4.0's performance was the best here. Even so, that's a good payoff considering the additional features of 4.0. Note also that although Novell offers internal

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Summary of features: Network operating systems

● = Yes ○ = No

	Microsoft LAN Manager, Version 2.2	Microsoft Windows NT with Advanced Server	NetWare, Version 2.2	NetWare, Version 4.0	OS/2 LAN Server, Version 3.0	VINES, Version 5.25(5)
Maximum file size	2G	1700G	255M	4G	2G	Unlimited
Maximum number of file locks	8192	Limted by RAM	2000	100,000	Limted by RAM	26
Maximum number of file opens	8192	Limted by RAM	1000	100,000	64K	250
Total hard disk storage	7.8G	Limted by RAM	2G	32T	48G	206G
Support for DOS files at server	●	●	●	●	●	●
Support for Macintosh files at server	Optional	●	●	Optional	Optional	●
Support for NFS files at server	○	○	○	●	Optional	○
Support for OS/2 files at server	●	●	●	●	●	●
Support for Unix files at server	○	●	○	●	● (third party)	● (third party)
Volumes/files can span multiple hard disks	○	●	○	●	○	○
Architecture						
CPU architecture supported	386, 486, Pentium	x86, Alpha, MIPS	286	386, 486, Pentium	386, 486, Pentium	386, 486, Pentium
Dedicated/nondedicated server	●●	○●	●○	●○	●○	●○
Maximum number of server connections per user	DOS clients, 26; OS/2 clients, unlimited	Limted by RAM	8	Limted by RAM	100	Limted by RAM
Maximum number os user connections per server	Limited by RAM	Limted by RAM	100	1000	1000	Limted by RAM
Multiple-processor support	○	●	○	○	○	●
Multitasking and multithreading	●	●	○	●	●	●
Multiuser operating system	●	●	●	●	●	●
Memory usage						
Dynamic memory resource allocation	●	●	○	●	●	●
System is protected from application access in recommended configuration	●	●	○	●	●	●
Maximum cache size	8M	2G	12M	4G	Less than 4.2G	Limted by RAM
Maximum amount of RAM	16M	4G	12M	4G	4.2G	256M
Minimum memory requirement	8M	16M	2.5M	6M	8M	8M
Network security						
C2 certification	○	Pending	○	●	○	Pending
Access to operations by user name and user group	●	●	●	●	●	●
ACLs (access control lists) managed on per-file basis	○	●	○	○	●	● (with file service directory)
ACLs (access control lists) stored with files	●	○	○	○	●	● (with file service directory)
User can limit amount of hard disk space	●	○	●	●	●	○
Manager can require periodic password changes	●	●	●	●	●	●
Offers intruder detection/lockout	●○	●○	●●	●●	●●	●●
RSA public and private key cryptography	○	○	○	●	○	○
Network printing						
Maximum number of shared printers per server	7	Limted by RAM	5	255	24	20
Assigns priorities to print queue	●	●	●	●	●	●
Multiple printers on one queue	●	●	●	●	●	●
Multiple queues on multiple printers	●	●	●	●	●	●
Multiple queues to a single printer	●	●	●	●	●	●
Operator notification of printer problem	●	●	●	●	●	●

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Summary of features: Network operating systems

● = Yes ○ = No

	Microsoft LAN Manager, Version 2.2	Microsoft Windows NT with Advanced Server	NetWare, Version 2.2	NetWare, Version 4.0	OS/2 LAN Server, Version 3.0	VINES, Version 5.25(5)
Network printing (continued)						
Automatically downloads print drivers to workstations	○	●	○	○	●	●
Remote queue management	●	●	●	●	●	●
Works with remote workstation printers	○	●	●	●	●	●
Notifies user of job completion	●	●	○	●	●	●
Protocol support						
AFP (AppleTalk Filing Protocol)	Optional	●	●	●	Optional	●
FTP	Optional	●	○	●	●	●
IPX/SPX	●	●	●	●	●	●
Large Internet Packet	○	○	○	●	○	○
NetBIOS (Native)	●	●	●	●	●	●
OSI	● (third party)	○	○	●	○	○
TCP/IP	●	●	●	●	Optional	●
Local server managment						
Displays error and system status log	●	●	●	●	●	○
Displays the number of packets and bytes sent and received	●	●	●	●	●	●
Displays cache statistics	●	●	●	●	●	●
Displayscache utilisation	●	●	●	●	●	●
Displays hard disk information	●	●	●	●	●	●
Displays LAN-driver statistics	●	●	●	●	●	●
Displays logical-disk statistics	●	●	●	●	○	●
Displays the number of open files	●	●	●	●	●	●
Displays paging statistics	●	●	●	●	●	●
Displays the percentage of CPU utilisation	●	●	●	●	●	●
Displays physical disk statistics	●	●	●	●	●	●
Displays redirector statistics	●	●	●	●	●	●
Displays server data statistics	●	●	●	●	●	●
Displays session statistics	●	●	●	●	●	●
Can display statistics of third-party server services	●	●	○	○	●	●
Can assign single-reference time server	○	●	○	●	●	●
Remote server management						
Asynchronous remote-console administration	●	○	○	●	● (third party)	●
Local-like operation	●	●	○	●	●	●
Remote-console modem callback	●	●	○	●	● (third party)	○
Remote-console session security	●	●	○	●	● (third party)	●
Remote installation	●	○	○	●	●	○
Remote upgrade	●	○	○	●	● (third party)	● (maintenance release only)
Supervisor administration functions						
Directory services	●	●	○	●	●	●
Directory services security	○	●	N/A	●	○	●
File system	●	●	●	●	●	●
Can move objects in directory services tree	○	●	N/A	●	○	●

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routing, saving you the ante of purchasing separate routers, some speed is lost. Even with NetWare 4.0's Large Internet Packets (LIP) and built-in burst mode, we were still receiving packets that were being cut down from 1518 bytes to 512. (Novell is looking into a solution.)

Novell was thinking globally in other ways with 4.0 as well: the company put all of the manuals online. It's a definite plus. Under Windows, the manuals are shown as icons, and you search on topics or commands.

By bringing forward all of the good NetWare features and building in scalability, NetWare 4.0 can give direction to and simplify your network environment, particularly if you are scaling up. Consider NetWare 4.0 for local, wide area, and global networking needs.

OS/2 LAN Server

By Ken Mackin

It's always been something of a given that you at least consider the product from IBM in any software or hardware category. For those of you ready to take the NOS gambit, you'll notice that OS/2 LAN Server, Version 3.0, provides most of the features that the other games here do — and some they don't — but this game also plays a bit differently.

How you place your bets in this one depends on your skill and risk profile. It also could depend on your corporate history — has your company been playing at the IBM table for a long time and for good reason? Is the IBM LAN game any different from the games at the Microsoft table? Although the tables may look similar, the games are different.

IBM has taken pains to improve upon the LAN Manager architecture it purchased from Microsoft. IBM has rewritten much of the code, including the file system. It has updated some of the interface tools to take advantage of OS/2 2.*x* and Presentation Manager (PM), and added features that make administration of large LAN Server networks possible, unlike LAN Manager.

The results are somewhat above the break-even point. But although IBM has made LAN Server fast, it has not played to full advantage its own Presentation Manager GUI. Most of the important tools run in OS/2 text mode. And although text mode works, why won't IBM demonstrate how powerful PM is? IBM could develop state-of-the-art object-oriented administration tools that allow for easy management of LAN Server networks large and small. No other network operating system has true object-based tools, not even Advanced Server. It's an opportunity.

When you talk about LAN Server, remember that there are really two bets here: an Entry edition for $1170, and the Advanced edition for $3379. The Entry product is slower than the Advanced, and forgoes a number of tools needed to work in a large network environment — such as a ring-0 version of the HPFS file system and SMB sideband. We reviewed LAN Server Advanced, which included these features. OS/2 LAN Server Advanced permits up to 1000 users per domain compared with 1000 for NetWare 4.0 and Advanced Server; 250 for NetWare 3.11; 70 for NetWare 2.2 (per server); 50 for LAN Manager; and 30 for VINES.

OS/2 LAN Server

SUITABILITY TO TASK	
Small network	GOOD
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LAN Server's current release does not support any movement and reconfiguration of domains. So, if your company, for example, were to buy out the competitor and you



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Summary of features: Network operating systems

	Microsoft LAN Manager, Version 2.2	Microsoft Windows NT with Advanced Server	NetWare, Version 2.2	NetWare, Version 4.0	OS/2 LAN Server, Version 3.0	VINES, Version 5.25(5)
Supervisor administrative functions (continued)						
Printing	●	●	●	●	●	●
Copy inhibit (.COM or .EXE)	●	●	○	●	●	●
Create	●	●	●	●	●	●
Delete	●	●	●	●	●	●
File scan	●	●	●	●	○	●
Grant	●	●	●	●	●	●
Hide directories and files	●	●	●	●	●	●
Indexed (set by OS)	○	○	●	●	○	○
Modify	●	●	●	●	●	●
Read only	●	●	●	●	●	●
Rename inhibit	○	●	○	●	●	●
Sharable attributes	●	●	●	●	●	●
Supervisor right	●	●	●	●	●	●
View	●	●	●	●	●	●
Audit trails						
File and object access	●	●	○	●	●	●
Log-on and log-off	●	●	●	●	●	●
System restart and shutdown	●	●	○	●	●	●
System errors	●	●	●	●	●	●
User and group managment	○	●	○	●	●	○
Network directory services						
Global name service	○	●	○	●	●	●
Globally distributed database	○	○	○	●	●	●
Host connectivity						
327x remote gateway option	●	Optional	●	●	Optional	●
Asynchronous gateway option	●	●	●	●	Optional	●
Asynchronous terminal emulation software option	● (third party)	●	●	●	Optional	●
Remote access service						
Included in package	○	●	○	○	○	○
Secure callback options	●	●	●	●	●	○
Supports asynchronous telephone communications	●	●	●	●	●	●
Supports dial-in using client/server architecture	●	●	●	●	●	●
Supports ISDN	○	●	●	●	●	●
Supports PAD	○	○	●	●	○	●
Supoorts X.25	●	●	●	●	●	●
Mac support						
Included in the package	○	●	●	●	○	○
File and print server	●	●	●	●	●	●
Gateway to other AFP servers	●	●	○	●	○	●
Integrated security	●	●	●	●	●	●
Integrated tools	●	●	○	●	●	●
Supports RIPing	○	●	●	●	○	●
Drivers supporrted						
NDIS	Client, servers	Client, server	None	Client	Client, server	Client
ODI	None	Client	Client, server	Client, server	OS/2 client	None

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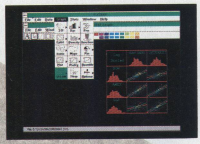
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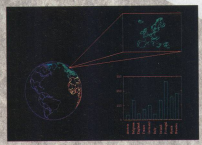
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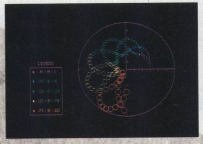
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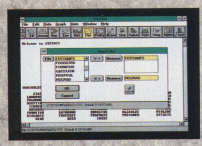
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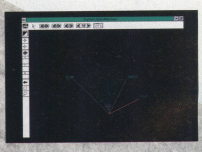












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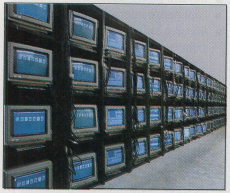
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wanted to recalibrate your network architecture to reflect the new regime, IBM supplies you with the full API to build your own tools. It says that companies big enough to need that kind of capability usually want to write their own, because they have customised environments to accommodate. But in fairness, none of the 'domain-type' NOSs has a solution to this problem.

Users in a domain can have access to aliases, remote applications (the OS/2 analogy to a Novell NLM or VAP), and Remote Initial Program Load (it loads operating system and device drivers on workstations without hard drives).

All of these features are set up and controlled in the OS/2 LAN Requester, the 'croupier' of this NOS. LAN Requester is the main administration program, where resources are divvied up and security maintained, users defined, and statistics observed.

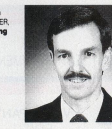
As it is, LAN Requester is consistent and has what you need to set up and maintain a network.

The OS/2 LAN Requester lets you redirect drives, check requester and server parameters, maintain Access Control Locks on files and directories, and determine the particulars of resource sharing, lamentably, using OS/2 text mode. The same program under PM could be very competitive. As it is, LAN Requester is consistent and has what you need to set up and maintain a network.

Users and groups can be configured and maintained there or in the OS/2 Workplace Shell using the User Profile Management Services (UPMS). The UPMS at first seems like a great program, but it cannot clone users. Although it works well, it's not very powerful. It appears at first as if you have to set up each user and group by hand. Actually, that's not true. You can clone users, but you must use LANUSER2, which is supplied on the productivity disk, but is not identified in the regular LAN Server install.

This is an excellent example of the challenge that novice or even semi-pro networkers would have using LAN Server. It does so much, but its capabilities are rarely obvious. If you need a function,

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AT A GLANCE

OS/2 LAN Server, Version 3.0

Distributor: IBM
Phone: 008 062 062
Price: Advanced edition, $3379; as an upgrade from a previous advanced edition, $2305; Entry edition, $1170; as an upgrade from a previous version of LAN Server, $440; DOS or OS/2 Requesters, $110 each
Server requirements: 386-based PC or better, 9M RAM (2.5M for Entry edition), 7.2M-8.2M hard disk space
In short: OS/2 LAN Server's limited implementation of OS/2's Presentation Manager and the sometimes difficult administration and documentation overshadow an otherwise fast, powerful NOS. The OS/2 LAN Requester, a fine central administration program, delivers all the goods but would be very competitive if written for PM. With lots of what you need in the way of networking in the Advanced edition, including a domain architecture, OS/2 LAN Server is a reasonable pick.

keep digging, it's probably there somewhere.

The online reference tools are powerful PM programs, but the switch between LAN Requester and the GUI On-Line and text-based Requester is disorienting. Although the GUI-based help is good — and the Command Reference excellent — only simple searches are allowed, as in Microsoft Windows. Only Novell thinks that it's important to include Boolean searching with its products.

Performance numbers on LAN Server put it near the top of the pack, behind NetWare 4.0 and VINES. The only twist is that lazy writes on the HPFS cache were stretched to 10 seconds to obtain that figure.

The tests performed were based on one network card per segment, while LAN Server supports four network cards on the same segment — all communicating via NetBIOS to a particular station. The system even balances the load between the network cards. IBM says that it can max out the 16M Token-Ring bandwidth using only a single properly configured server.

LAN Server is a powerful NOS with many of the tools needed to run a network large or small. At $3379 per server, with up

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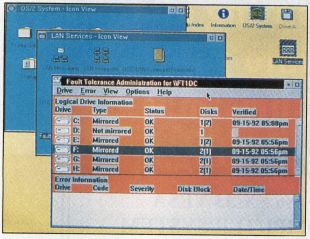
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Network administration under LAN Server is accomplished, not surprisingly, under IBM's OS/2; but some is text-based

to 254 users per segment, for a total of a 1000 log-ons, LAN Server offers plenty. The Entry level for $1170 is one of the best deals in networking. Although slower and as tricky to configure as its big brother, the Entry level is a lot of networking for the price. If IBM could only reorganise the table so that network gamblers could get into the game more quickly, the chips would have a chance of piling up.

VINES

BY Robert Sparre

For a long time now in the networking world, VINES (for VIrtual NEtwork System) has been a compelling though complex risk — with high payoffs — for businesses that maintain global connectivity. With the release of VINES, Version 5.52(5), Banyan Systems continues to stack the deck in favour of administrators of large enterprise networks with StreetTalk III, the third generation of the powerful VINES distributed directory services; improved mail and print services; and excellent administrative tools. Its lack of server fault tolerance keeps some otherwise interested LAN managers holding onto their chips, and it lagged behind the other enterprise-class NOSs in our performance testing.

Even for the new LAN administrator, building a VINES network does not require major resources in time or training. Setting up servers is a menu-driven process, and VINES's excellent administrative tools allow a wide range of choices in security features.

With StreetTalk III's Directory Assistance (STDA), a local copy of resources is available to end users, administrators, and applications. This gives instant access to information about the network without the need for wide area network queries. StreetTalk III can now contain information in the form of objects on any resource. These extended attributes can be a picture of the user, a description of X.500 addressing, or a printer model and installed fonts. STDA can now get this data from StreetTalk so that a user, for example, can pop up a picture and paste it into an application.

Banyan has also dramatically improved the VINES mail engine. Mail now runs as a multi-threaded service, so that messages with complex addressing for distribution to remote sites do not keep normal messages from being processed and delivered. Support for new options such as priority and deferred mail add powerful flexibility. VINES mail always has been a robust application, because it is so well integrated with StreetTalk — eliminating the need for a mail administrator. Neither is there a need to add users or log-on to the mail system, because it is automatically synchronised with the StreetTalk directory service. However, for integration with foreign mail systems, Banyan's Simple Mail Transfer Protocol (SMTP) mail gateway is functionally weak. You'll have to look to third-party solutions for more robust capabilities, such as support for binary attachments.

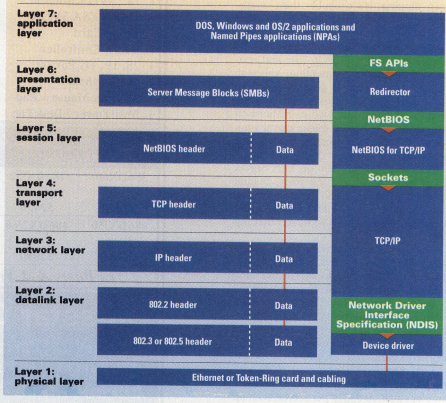
Banyan's multiserver integration couldn't be simpler. The only task with a new server is connection to the network. StreetTalk takes care of distributing resource and topology (routing) information to the new server. Wide area connections, such as asynchronous dial-up, may require some configuration — supplying a phone number, for instance.

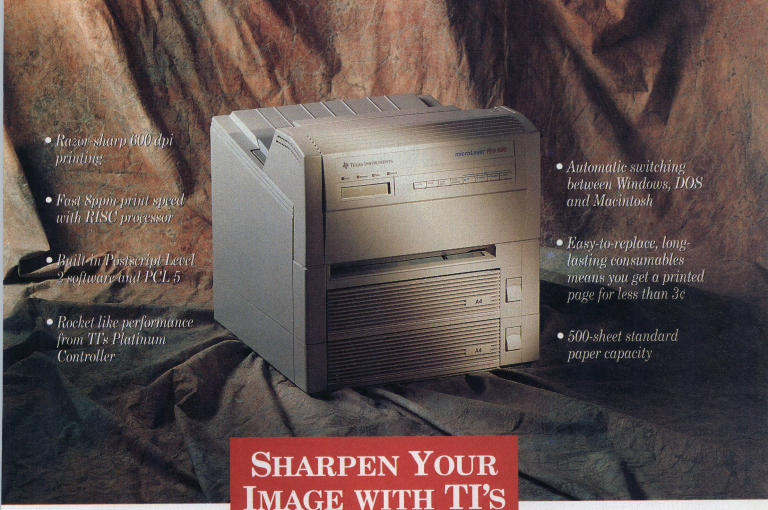
Support for modems also has been a sore spot for many customers, and improvements have been slow in coming. Hayes and Telebit Corporation are the only specifically supported vendors, and initialisation strings on the server side are hard-coded. This leaves little flexibility for the user in making equipment selections. Although there is more flexibility in writing modem

VINES

SUITABILITY TO TASK	
Small network	GOOD
Medium network	EXCELLENT
Medium to large network	EXCELLENT
Large enterprise network	EXCELLENT

OS/2 LAN Server architecture





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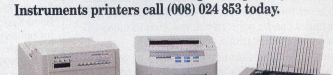
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AT A GLANCE

VINES, Version 5.52(5)

Distributor: MPA International
Phone: (02) 906 4499
Price: 5 users, $2958; 10 users, $5427; 20 users, $8425; unlimited users, $16,528
Server requirements: 8M RAM, 200M disk space, 386DX/486SX, VGA recommended (10-30 users)
In short: VINES delivers impressive large network integration and interoperability, in part through the third generation of StreetTalk (III), its fine global directory service. VINES offers excellent security, symmetric multiprocessing, open-standards integration and reliability, but continues to take a hit for its lack of fault tolerance. Long-time users say they are beginning to get the company's attention in electronic forums.

scripts on the PC side for client dial-up, it is not effortless and you may require assistance from someone with data communications experience. Banyan says it will address customer demands in this area.

VINES supports up to four NICs per server for any topology; configuration is accomplished through simple menus. VINES automatically takes care of any



VINES' straightforward character-based interface lets administrators manage user accounts across a WAN fairly easily

protocol binding and translations required between the NICs for routing to different LAN segments and topologies. Network management tools that are built into the console — and available from the client with the VINES Network System Management module ($995) — allow the administrator to see quickly any problems with a NIC that are based on input or output errors, dropped packets, and so on.

On the client side, Banyan is no longer developing native VINES drivers, having stated that NDIS is its client driver solution for the future (Banyan will maintain the drivers it already has developed). NDIS has been the curse of many administrators because of the complexity it adds in configuration and support over simpler native drivers, and information on the practical configuration of NDIS drivers has been sorely lacking in most vendors' manuals. Banyan has been improving its NDIS documentation, and the latest manuals excel in this area. Despite this, many users prefer and have turned to packet drivers, which have proven to be simpler to configure and support, and are also superior performers.

VINES provides adequate monitoring and tuning tools, but for large, centrally managed information system administration, you'll want some additional tools, such as Banyan's SNMP agent. The latest release, Banyan SNMP Agent, Version 2.0,

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DIGITAL dr RESOURCES

Fresh help for Pathworks

BY STUART HERSHKOWITZ

If you've been adventurous in the NOS casino and you have the mixed bag of server configurations on your network to prove it, take a look at Digital Equipment's Pathworks, Version 5.0, for some help in tracking your server resources (due out late this year). But don't expect it to replace your NOS's administration program just yet.

Digital's package will offer multivendor NOS management with user-friendly icons; automated installation and configuration; a configuration, monitoring, and tuning utility for Pathworks OpenVMS servers; simultaneous loading of NetBEUI, IPX, DECnet, LAT, and TCP/IP; a faster TCP/IP transport stack; and interconnectivity to NetWare, Pathworks, and Microsoft LAN Manager LANs.

We installed Digital's beta version of Pathworks on a client simultaneously administering a LAN Manager server and a NetWare 3.11 server. We could preview Digital's client software without installing a Pathworks host because, unlike most of the NOS vendor community, Digital sells its NOS and client shells separately.

Pathworks program group, which is created during installation, holds Pathworks' connectivity and administration tools. The Pathworks Manager displayed all workstation resources in an easy-to-use viewer called the Browser. LAN Manager domains, NetWare servers, local disks, and printers were all easily accessible.

The icons for Browser components are intuitive, and single mouse clicks expand Browser items to display more selection depth.

We could view server information, edit the system log-on script, and enable or disable the user log-on as well as the Transaction Tracking System. We could also administer LAN Manager servers, file services, print queues, users and groups.

As with most beta software, previewing Pathworks was not without technical glitches. Digital did not supply host software for this preview, so a preview of DECnet-specific utilities, such as the link into DEC VAXmail, was not possible.

The biggest drawback to Pathworks was its incomplete design: It cannot fully replace either SYSCON and PCONSOLE or NETADMIN. And any NOS-independent management tool that forces an administrator to use other management tools offers no significant benefit.

Specifically, for LAN Manager, Pathworks could not change the role of a server or invoke auditing. The most glaring omissions were print-queue management, share creation, and the ability to attach or detach from used resources.

Similarly, Digital abbreviates NetWare management: supervisors have no control over account and station restrictions, intruder detection and lockout, or assignment of console operators and workgroup managers. Neither can they give trustee assignments to groups. You can manage print queues but not print servers, and the server's AUTOEXEC.BAT was out of reach.

Even with its deficiencies and missing pieces, Pathworks holds great promise. It has an intuitive graphical approach for managing a complex mix of software. Until it can replace the management tools of NetWare and LAN Manager, however, it remains primarily for Pathworks administrators or multiple LAN users.

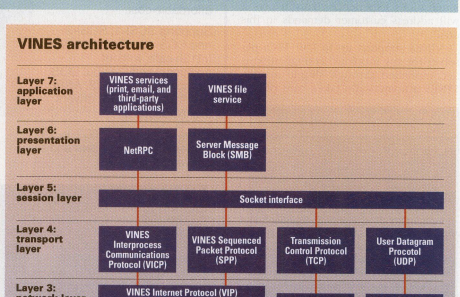
allows active control of servers via the SNMP SET command, so that parameters such as cache and buffer sizes can be adjusted from the SNMP management station.

Network printing has been less than stellar over the years with VINES, but some rather impressive options have emerged. The number of print queues per server has increased to 20, and VINES supports more than one printer per queue.

In addition, two new LAN-attached printing options have been introduced. Developed in cooperation with Digital Products, they support any printer using Hewlett-Packard's Modular I/O slot, or you can select the standalone device, which allows any parallel or serial printer to be used.

Third-party and shareware software products are also available for using TCP/IP-attached printers, such as HP's JetDirect card, or redirecting VINES print queues to any existing Unix print queue on another host.

Backup options and disk utilisation have not been so well taken care of. The backup/restore menus have been improved, but still are not very clear for administrators who want to restore multiple files or directories. Scheduled backups also force a read verification, which doubles backup time and is not always wanted; you



The Answer Is Right In Front Of Your Eyes



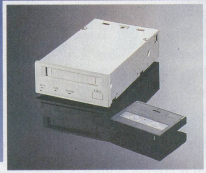
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Benchmark tests: Network operating systems

What the numbers mean

Each of these network operating systems offers a different combination of rich features, expandability and performance. For example, some NOSs are fine for basic file transfers but cannot handle the large loads that might reflect the demands of a growing enterprise network. You'll need a 32-bit NOS for any large networked environment.

Our tests gauge NOS performance in three areas related to file transfers. Specifically, we want to find any performance enhancements or degradations caused by NOS internal routing, discover if large hard disk caches are more or less advantageous than small hard disk caches, and see if different packet sizes affect the underlying communications protocols.

The total disk cache memory made available by the NOS plays a major role in enhancing a server's performance; other enhancements depend on how the client and server protocols negotiate the size of packets on the wire and the total number of packets within a frame. We evaluated the NOS protocols by monitoring the wire with Intel's NetSight Analyst protocol analyser. Those that best negotiated the size and amount of packets per second on the wire were superior performers.

Moreover, a winning setup — one with a large disk cache that efficiently negotiates packet frame size — should offer the best performance. Products that support internal routing should have lower throughputs than products using external bridges. Servers that route internally honour file read and write requests over packet-routing requests; external bridges free the server from performing the routing function but are an additional expense in terms of cost and maintenance.

Bench press

We constructed two test-beds for our review (see the accompanying diagram). We used one configuration to test products that perform packet routing between adaptor cards within the same server (VINES 5.52(5) NetWare 2.2, and 4.0). We designed the other setup for NOSs that use unroutable protocols (OS/2 LAN Server 3.0, Microsoft LAN Manager 2.2, and Microsoft Windows NT with Advanced Server).

Each test-bed consisted of three Compaq Deskpro 486/33M PCs acting as file servers. Each server contained 32M of RAM and one 330M hard disk. We installed two Eagle NE3200 Ethernet adaptors into each server, creating two separate LAN segments. For each segment, we used 3Com TP Link Builder FMS MAU unshielded twisted-pair Ethernet hubs. To test VINES and the two versions of NetWare, we added a third NE3200 adaptor to each server via daisy-chained thin Ethernet cable to form a backbone segment. For all the other NOS tests, we used three Cabletron EMME local Ethernet bridges to join the six Ethernet segments. Both the backbone and bridge methods let clients from one segment access a server on a separate segment.

We used equal numbers of Compaq Deskpro E PCs and Deskpro 486/33M PCs as clients. Each PC contained a 3Com 509 Ethernet adaptor and 4M of RAM. Each server had two PCs on each segment: one local client and one remote client to another server, which communicated through internal routing or external bridging. The load presented to each server thus appeared as two local clients and two remote clients, for a total of four.

We used ZD Labs' NetBench, Version 2.06, to test file-transfer performance. Version 2.06 lets us adjust the block sizes for read and write operations from each client, letting us see how the protocols handle different sizes. Larger block sizes negate the effect of local buffering at the client and force the OS to send varying packet sizes over the wire.

One iteration of our test sends a 1M file from each client to its respective servers using 512-byte, 1024-byte, 1500-byte, and 4096-byte packets. A second test run uses the same packet sizes but sends a 4M file. The 16M of aggregate data used in the second run puts stress on NOSs that use less than 16M of RAM for their disk caching.

Hitting the high notes

To ensure peak performance, we optimised each product for our tests. VINES supported the entire 32M of server RAM, which let us increase the available communications buffers. We also set communications buffers in VINES' clients via Banyan's PCCONFIG utility. VINES uses a licensed version of FTP Software's IP protocol that lets clients and servers communicate with each other. VINES forced the data written from cache more often than the other products did, which slowed its relative performance.

NetWare 4.0 supports system RAM well above 32M. NetWare versions using the Intel 386 CPU's 32-bit instructions can also use up to 85 per cent of the available RAM for disk caching. NetWare 2.2's 16-bit design limits the size of the disk cache, however, and affected its throughput on our 4M file transfers.

Novell's latest IPX burst-mode protocols showed significant performance increases as clients and servers negotiated multipacket frame sizes through bridges and routers. In addition, Novell has released its Large Internet Packet (LIP) protocol, which removes the 512-byte ceiling for internet packets and allows any packet size to route between segments.

To get the best performance from Novell's 32-bit NOS, we increased the minimum and maximum receive buffers to the highest levels. We set the maximum physical receive packet size to its largest value — 1514 bytes for Ethernet. Doing so meant the IPX protocol would handle the larger packet sizes created from NetBench without breaking the packets down.

NetWare disk volumes also let you set the fixed block size for file allocations. With an 8K block size, even a 1-byte file would use 8K of disk space. NetWare 4.0 defaults to the 64K block size, which increases the amount of data written to the disk in a single write request.

Novell's PBURST permits packet negotiation between the server and client; instead of an acknowledgement for every data packet, PBURST provides a series of data packets for every acknowledgement. LIP lets packets larger than 512 bytes route between internal segments.

LAN Manager also has a limitation: a 16M server RAM limitation. Microsoft did replace OS/2 1.3's HPFS with HPFS386 for LAN Manager. This enhancement to HPFS allows for a larger disk cache, which helped improve performance in servicing file requests. LAN Manager performed well on the 1M file-transfer test with the larger packet sizes because it used NetBEUI.

LAN Manager, LAN Server and Windows NT with Advanced Server all use NetBEUI. Because NetBEUI transfers requests in 64-byte packets, products using this protocol have an advantage for data transfers in our 4M tests.

Advanced Server uses NetBEUI when dynamically changing the OS environment, by allocating the "numrecbufs' as needed at the file server. Instead of shutting down the server and reconfiguring the system, Advanced Server restructures itself during normal operation. Able to access the full 32M of server RAM, it exhibited good throughput on our 4M tests because of the additional cache. Its scores fell short of NetWare 4.0's numbers, however, because the basic Windows NT OS uses up to 8M more RAM just for the OS.

LAN Server also uses NetBEUI to transfer data over the wire, and IBM adds some of its own technology to NetBEUI, such as automatically negotiating the number of outstanding packets by listening to the wire for traffic. Clients that find light traffic send large bursts of packets and throttle back as LAN traffic increases. LAN Server resides on the 32-bit OS/2 2.1. And as with other OS/2-based NOSs, we noticed that even with lazy writes set to On, the server's hard disk was accessed continuously. This increased server utilisation, which slowed data throughput. We used the option to decrease the time the OS needed to write to disk from the cache, increasing throughput by 10 per cent.

The results are in

Small, 512 and 1024-byte packets increased the stress on each server's CPU as more requests became queued, limiting overall throughput. NetWare 4.0 performed best when servicing small-packet requests. We measured VINES' CPU utilisation at 80 per cent during the 512-byte packet tests, while NetWare reached 50 per cent utilisation. Products with higher throughputs

Continued on page 142

Benchmark tests: Network operating systems

Continued from page 141

tended to have lower CPU utilisation.

The data throughput increased with packet size, since more data was transferred within a single packet up to Ethernet's maximum packet size of 1.5K. All NetBEUI users negotiated the number of outstanding packets using one server acknowledgement to the client. Novell's products offered the best data throughput because of efficient hard disk caching and packet-burst technologies. Although Banyan's protocol uses a streaming-packet method, we found that the CPU percentage was very high for all our tests, showing that the forced writes to disk created added overhead on the server CPU.

Client testing

LAN Manager and LAN Server required external equipment to forward packets to another segment. Without the extra overhead placed on the OS for routing packets within the server, IBM and Microsoft clients both had excellent results through the Cabletron bridges.

Only the NetWare versions and VINES support internal routing within the file servers, but our test results suggest that network managers should not use internal routing unless their budgets don't allow for the purchase of external connectivity devices. The performance results for the internal-router products showed that NetWare's OS performed better with smaller packet sizes.

As the packet size increased, however, VINES was able to keep from fragmenting the packet into segments smaller than 1500 bytes. Our monitoring of the backbone segment showed that NetWare 4.0 using LIP did at times route the packet at 1500-byte frame sizes, but more often the packets were fragmented down to 512 bytes. The LIP algorithm was not able to maintain the larger packet sizes between segments when faced with the extremes of testing.

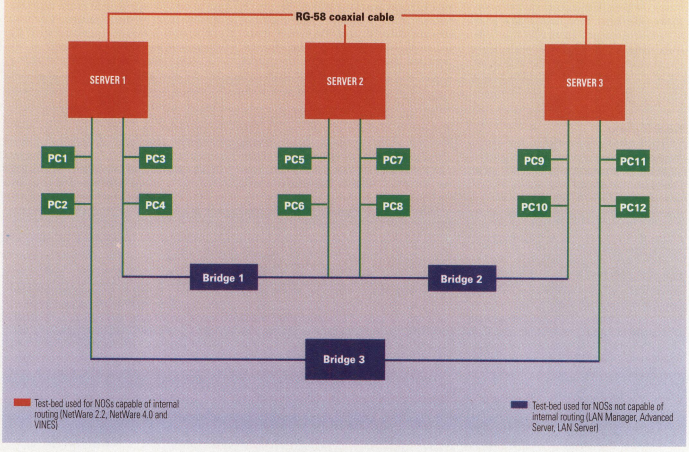
When using 4M files, NOSs with limited caches (LAN Manager and NetWare 2.2) soon used them up, sacrificing throughput. All the NetBEUI-based NOS test results are tightly clustered, with LAN Manager leading the crowd. Novell's 32-bit offering, which uses the burst-mode protocol, performed best. VINES performed well with small files, but it quickly used up its cache, yielding poor performance numbers with large files.

have to do the backup manually to turn off the read verification. Third-party solutions can back up user data and some StreetTalk information across the network, but APIs for backing up and restoring the full StreetTalk database do not exist.

This leaves the server-based backup as the only robust source for rebuilding a server. VINES has no disk quota system to limit user disk consumption, nor any compression or archiving schemes. Again, third-party options are available, but clearly this function should be built-in to the base OS.

VINES's maturity in multiserver network design continues to place it at the top of the extended network deck, despite the inroads being made by other NOSs. Coupled with Banyan's newly demonstrated openness (especially on electronic forums) and customer focus, VINES offers some of the most impressive connectivity options in the industry for both new and existing networks.

NOS test-bed





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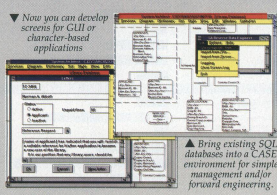
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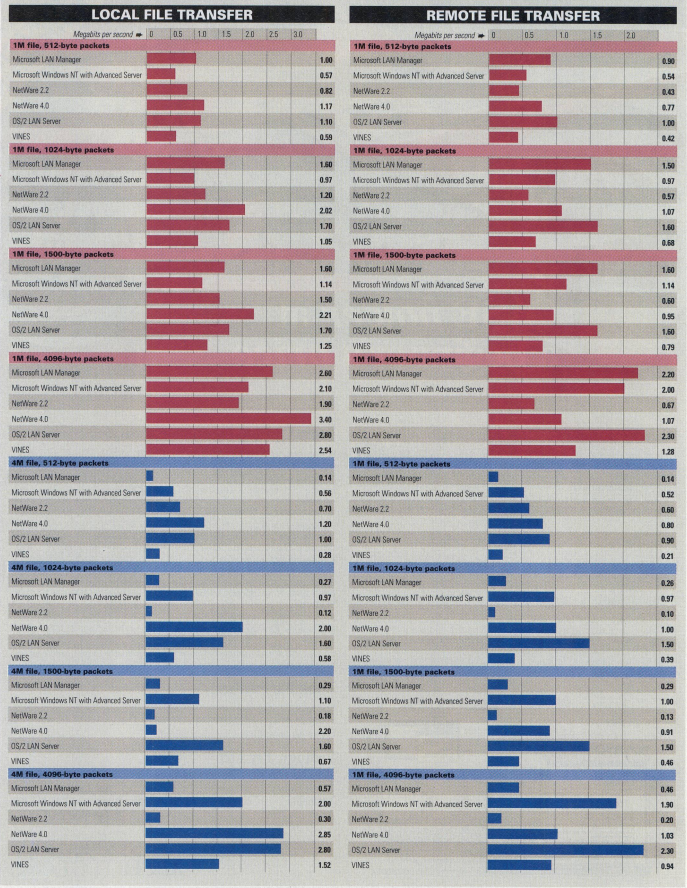
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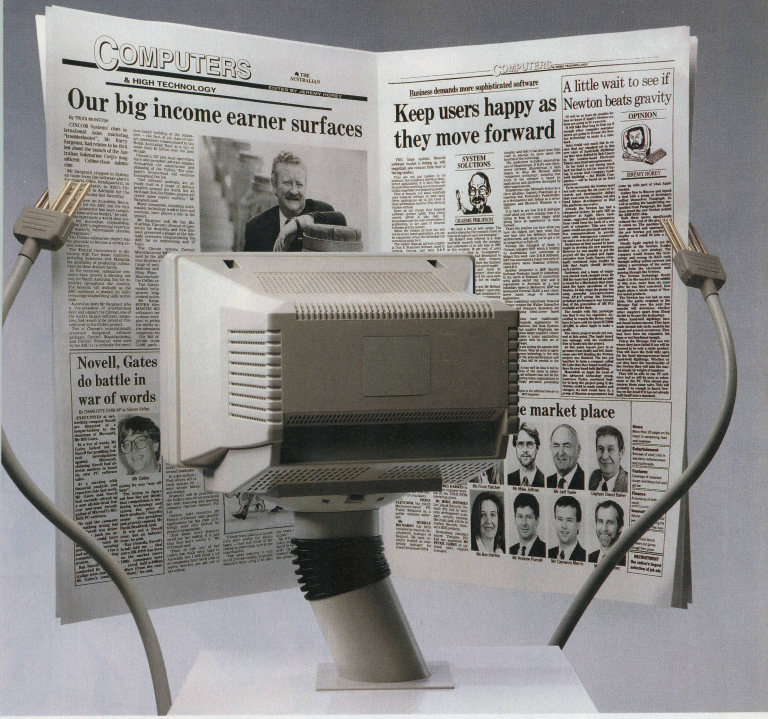
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Benchmark tests: Network operating systems



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BY JIM ENDERSBY



Better than crayons

The demands on the average drawing package by users have been increased significantly since their inception. APC looks at how well these demands are being met and if available products really are better then crayons.

The five products reviewed here are all vector-based drawing programs; they store a drawing as a mathematical description of its curves, fills, and so on, as opposed to bitmaps, which are patterns of dots. Vector-based programs have different strengths to those associated with bitmap editors (such as Adobe Photoshop); drawing programs typically lack features such as an eraser or smudge tool, for example, but they are well suited to producing complex technical drawings and full-colour line illustrations. However, any vector-based drawing program can be daunting for a novice; if you're new to drawing with a computer don't expect to be churning out masterpieces on your first day – or even by the end of your first month.

Another potential pitfall with drawing programs is that they lead the software world when it comes to feature bloat; the phenomenon which involves every program being upgraded every year and new features being added at every upgrade. The number of disks multiplies, the system requirements get more and more extravagant, and the printed manuals consume more and more trees. This process would be good news for we customers, except for the disturbing tendency for developers to add new features instead of improving existing ones – each version of CorelDRAW, for example, is significantly slower than the one before – and it's certainly not alone in this tendency. Another trend CorelDRAW has established is to bundle ever more additional programs with the core product; as Corel adds more and more of these, other manufacturers are forced to do the same.

If current trends continue, Version 8 of CorelDRAW or Designer will ship on 72 floppy disks (or six CD-ROMs) take two days to install, require a 100MHz RISC-based workstation with 256M of RAM to run on, it will include everything from spreadsheet software to a multimedia Italian cooking course, and will take three hours to open a drawing and another two to print it. I exaggerate, of course, but not by much.

Australian Computer EDITORS CHOICE

■ CorelDRAW 4.0
■ Micrografx Designer 4.0

The Windows drawing package competition is now a dead-heat between CorelDRAW 4.0b and Micrografx Designer 4.0. Which one you choose will depend upon what sort of work you want to do. Corel has the lead in add-on programs, bundled fonts and the like, and is a little less greedy of system resources than Designer — which tends to make it very slightly faster on the average system. However, CorelDRAW's bugs (not all of which have been fixed in the maintenance release) are a source of irritation.

Designer, on the other hand, has clearly stolen Corel's lead in 3D drawing tools and has at least caught up in most other areas. Its new interface is very clean and much easier to use than any previous version. However, if Micrografx were being really honest in its marketing, it would have to admit that 8M of system RAM rather than 4M is really the minimum needed and 16M — or more — is ideal. The company will probably need to ship a maintenance release in the next few months to address one or two minor problems, but Designer is currently a very impressive product.

Honourable mention must also be made of FreeHand; while it lacks some of the features of CorelDRAW and Designer it is easier to learn and use than either of them, making it a better tool to start drawing with, but one that retains enough power to allow you to develop your skills. Only its high price stops it being an ideal beginners' program. Keep an eye open for its next version — which should be very interesting.

What we are likely to see in the next 12 months is some 32-bit versions of these programs, either for OS/2 or Windows NT, or Pink, or Unix or something else . . . Therein lies the problem. Several of the manufacturers have told me quite candidly that they're holding off on new 32-bit versions of their products until they have a clearer idea of who is winning the operating systems war. And who can blame them? One or two of these products have previously appeared in OS/2 versions, but sales have proved disappointing; the manufacturers are unlikely to spend more time and money either on upgrading previous OS/2 versions or developing new Windows NT ones until they're sure that there is a large enough user base to justify the effort.

Nevertheless, the increasing strain on system resources and memory usage which Designer 4.0, in particular, is creating reveals the ultimate limits of Microsoft's 16-bit 'DOS and Windows' combo. Designer's internal code is already all 32-bit, it will be ideally placed to take advantage of the increased stability and better memory management that a future 32-bit operating system offers. Without a 32-bit operating system, most of the programs reviewed here are going to crawl to a complete standstill before long.

One last point; I have to confess to a certain bias when it comes to reviewing CorelDRAW, because its the drawing program I have been using every day for the last three years and, as with any software you use a lot, I've built up a real love-hate relationship with it. The program you use every day will always seem a bit more 'intuitive' than any new software, simply because you know it so well. However, the fact that you know it so well makes you more critical of it — I'm aware of flaws in CorelDRAW which probably also exist in the other programs reviewed; it's just that I haven't had as much time to discover them in the competition. There are undoubtedly both problems and features lurking in all these programs which I haven't discovered yet: if you have a specific use in mind that I haven't had space to discuss here, make sure the program can do it before you buy it.

Adobe Illustrator 4.0

SUITABILITY TO TASK	
Learning to draw	POOR
Technical & precision illustration	GOOD
Desktop publishing & layout	FAIR
Full-colour illustration	GOOD

Adobe Illustrator 4.0

When Illustrator first arrived on the Windows platform, I found it hard to understand what all the fuss was about. My Mac-using colleagues had told me so much about this fabulous program that I was quite excited when I first got my hands on a copy —but I was disappointed; Illustrator lacked a whole raft of tools that I regarded as essential. Once I started using it, however, it revealed some surprising strengths.

The list of features Illustrator lacks is rather long; there are no named layers or styles, no 3D tools of any description, no support for master pages, templates, OLE or TrueType fonts. It doesn't even have basic commands such as alignment to a common axis or the page.

What Illustrator *does* have is bullet-proof PostScript output, with very reliable printing, colour separation and font-handling (not surprising, since Adobe devised the PostScript language itself). It also has a high degree of precision; common transformations such as scaling and rotating can be performed by typing in exact dimensions, angles and distances. The program also allows you to measure distances and angles on your drawing very accurately.

The dialogue boxes which allow the precise transformation of objects also allow you to copy the object as you do so. The Transform Again option will repeat both the transformation and the duplication; this feature almost makes up for the lack of an Array command (which Designer has).

Text handling in Illustrator is pretty good, but you can only use Type 1 PostScript fonts with this version of the program. It allows very precise control of spacing, kerning, tracking and leading. It is the only page-layout software I have ever come across that allows you to set hanging punctuation. This is a very high-quality refinement, traditionally used when setting justified text, in which the punctuation marks are 'hung' outside the vertical edge of the type, thus creating a smoother column edge. This degree of refined control makes my typographer's heart sing. Unfortunately, however, Illustrator's screen redraw is so agonisingly slow when handling blocks of text that it would be unbearable to use the program if you had more than a few lines of type; it is actually slower than CorelDRAW and Designer — both a real pain when handling paragraph text. This is a great pity because Illustrator would otherwise be an ideal tool for complex,

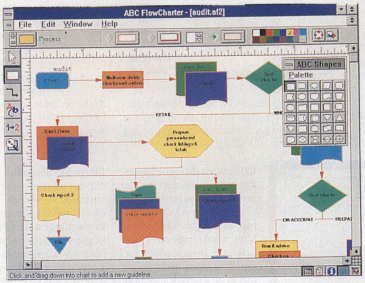
AT A GLANCE

Adobe Illustrator 4.0

Distributor: Infomagic
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Price: $1049
In short: A clean, crisp classic with plenty of precision, as long as you have the patience to master it. It's starting to look a little old, weary and pricey by comparison with its flashier competition and is badly in need of a major upgrade. Illustrator 5.0 for the Mac has been announced and PC users would probably be well-advised to wait until there is a Version 5.0 for Windows; nothing has been announced as yet.

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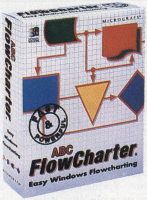
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JCA 1461

Graphics software: suitability to task

Each of these programs has its own strengths and weaknesses; to try and give you an idea of what they are, we've analysed the suitability of each one for completing a specific task.

Learning to draw

How good is the product for a beginner who is trying to learn how to draw with a computer? This includes assessing how strong the tutorial is (and whether it's onscreen or simply in a book) and how complex the tools are. Programs score highly for an easy-to-use interface and are penalised for things such as bizarre names for tools and obscure keyboard short cuts.

Technical and precision illustration

Key features here are the variety of alignment tools available (including guidelines, grids, etc); the ability to precisely position and scale objects by typing exact coordinates and dimensions; and the capability to define and apply a uniform scale; to create scale plans. Programs lose points for lacking any of these features.

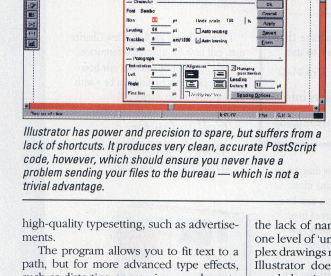
Desktop publishing and layout

Essential tools here are the ability to create multi-page documents, use named text styles, templates and column guides. The program must also be able to import text files, preferably in a variety of formats. Being able to do all these things reasonably quickly is also desirable.

Product name	SUITABILITY TO TASK
Learning to draw	POOR
Technical & precision illustration	FAIR
Desktop publishing & layout	GOOD
Full-colour illustration	EXCELLENT

Full-colour illustration

This is the top-end of the scale. Key features here are a variety of colour models (4-colour process, Pantone, etc) and the ability to produce accurate colour separations, including trapping for spot-colour work. Other essential tools are named layers (or at least the ability to lock or hide objects) and interruptible screen display (to speed up work) and as many shortcuts for complex tasks as possible. 3D tools are also an increasingly important consideration.



Illustrator has power and precision to spare, but suffers from a lack of shortcuts. It produces very clean, accurate PostScript code, however, which should ensure you never have a problem sending your files to the bureau — which is not a trivial advantage.

high-quality typesetting, such as advertisements.

The program allows you to fit text to a path, but for more advanced type effects, such as distorting or warping, you have to use the separate Adobe TypeAlign program, which is bundled free with Illustrator, as is Adobe Separator, which can produce accurate four-colour separations from any PostScript file. Other than a four-colour process, however, colour support in Illustrator is awkward. To obtain access to Pantone, FocoItone, Trumatch or Toyo colour systems, for example, you have to open a separate Illustrator file at the same time as the one you're working on; this process makes the appropriate colour system available. To apply colours to an object is even more cumbersome; you can only do so using a dialogue box — there is no onscreen palette. As with a number of Illustrator's dialogue boxes, the colour options one can be left open on screen while you work on your drawing, but unless you have a very high resolution screen the dialogue boxes cover too much of your drawing for this to be a practical option.

Illustrator is difficult to learn and to use, but working carefully through the tutorial book (which uses sample files supplied on disk) will reveal an impressive degree of power and precision. Unfortunately, access to this power is hampered by poor interface design. The almost complete lack of 'short cut tools', which can make drawing so much quicker and easier, is a serious weakness; in particular, the lack of named layers and having only one level of 'undo', makes producing complex drawings much too difficult. However, Illustrator does have basic but effective graph drawing tools built into the program.

When Illustrator 4.0 appeared it had a definite edge in precision, but it has since been overtaken by both Designer and CorelDRAW. Version 5.0 of Illustrator is due in the next few months; Adobe will need to add a great many features to have a chance of even catching up with Corel and Micrografx — to overtake them will be a very tall order.

Arts & Letters Graphics Editor 3.12

Arts & Letters is an odd program. As the phrase 'graphics editor' suggests, it is primarily designed to allow you to edit clip-art images — and there are over 8000 supplied — rather than producing your own original illustrations. This approach might suggest that the program is aimed at beginners or non-artists, yet the tools it does have, primarily for editing bézier curves and modifying images, are surprisingly sophisticated; complex but generally well-implemented.

Arts & Letters is easily the fastest of the programs reviewed here — taking just four seconds to launch — and makes the fewest demands on system resources and memory. The manufacturers claim it will run on a 286-based computer with only 2M of RAM; which is certainly not true of any of its competitors. So if your computer is a few years old (and perhaps a bit underpowered for programs like CorelDRAW or Designer) Arts & Letters would be an obvious choice. The version reviewed is the standard one, but there is a special maths coprocessor-enabled version that is even faster; I suspect the coprocessor version would really fly on a 486DX.

As a result of the program's 'editing not creating' philosophy, it is rather short on basic drawing tools, even the humble rectangle and ellipse tools are absent, but this lack is compensated for by the massive library of standard shapes and symbols, which can be added to a drawing and then modified in a huge variety of ways. The symbol selector dialogue box can be used like a standard Windows dialogue, and closed when you have finished with it, or you can instruct it to 'stay' and it becomes a floating daughter window, from which you can keep reselecting symbols. This is a particularly intelligent implementation of this sort of feature (which is used for other Arts & Letters dialogues, too) because it allows the user to work in whichever way suits them best.

The online help system is well-designed

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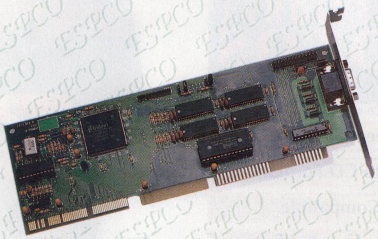
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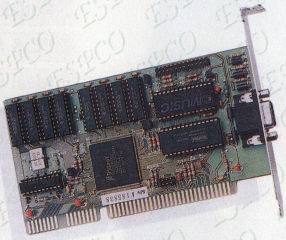
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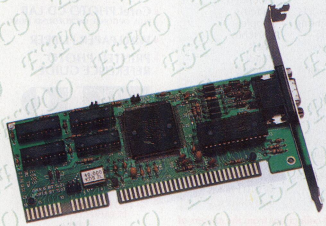
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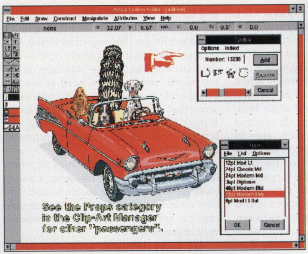
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Arts and Letters' ability to combine and edit clip-art images allows you to create quite complex pictures without being able to draw at all. The ideal tool if you need to draw a Chevy full of dogs on their way back from a holiday in Pisa

and almost completely replaces the printed documentation, which has been reduced to a slim introductory volume and a guide to the supplied clip art. The help also includes good onscreen tutorials and a slightly bizarre system of demos called 'Show Me'. The latter allow you to see an onscreen demonstration of the feature you need help with, which would be a good idea, except that the demos use the Windows Macro recorder to play them. As the manual warns, this can create havoc if you select 'Show Me' when you're in the middle of a drawing (which is the most likely moment to seek help) because the Macro Recorder will blithely apply commands such as 'Select All' to the elements you've drawn and then move or modify them. Since Arts & Letters doesn't allow multiple drawings to be open at once, you can't just open a blank document for the demo, you have to save and close whatever you're doing, watch the (very slow) demo and then re-open your drawing to practice whatever it is you've just learned. A basically good idea, poorly implemented.

Arts & Letters Graphic Editor 3.12

SUITABILITY TO TASK	
Learning to draw	GOOD
Technical & precision illustration	FAIR
Desktop publishing & layout	POOR
Full-colour illustration	FAIR

The programs text tools are reasonable, but not spectacular. You can set values for letter, line or word spacing, plus tracking, via the type attributes dialogue box. These combinations can be named and accessed via styles windows, so that uniform text characteristics can be defined and used throughout a document or series of documents. However, there is no facility for editing spacing interactively, using the mouse, nor can individual letters be manipulated (made larger or shifted, for example) other than creating separate text blocks. Arts & Letters supports both Adobe Type 1 and TrueType fonts, and also has a selection of proprietary format fonts. Type can be wrapped to a curve and have various warp and perspective effects added, but in the case of Type 1 or TrueType fonts, the type must first be converted to curves; after which it may no longer be edited.

Arts & Letters lacks many of the high-end features that are generally regarded as essential for professional drawing programs. There is no facility to create separate layers (but individual objects can be locked or hidden), nor are there any 3D tools of any description. However, the program does have some advanced features, such as the ability to save various combinations of attributes (line thickness, colour of fill, and so on), name and save them, and apply them to other objects, effectively providing a styles feature. Arts & Letters also allows you to save various combinations of default settings (page size, stylers, attributes, etc) as a re-usable default file, which can then be applied to any new document, effectively providing a template or stylesheet capability. The warping and envelope effects are also well-implemented and can also be saved as named styles.

AT A GLANCE

Arts & Letters Graphics Editor 3.12

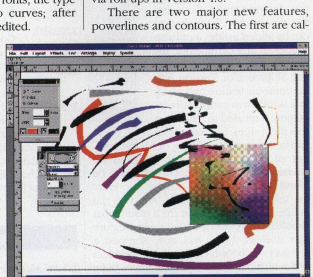
Distributor: Alkira
Phone: (02) 876 8000
Price: $299
In short: Overall, Arts & Letters is a an unusual but nonetheless attractive program. If you lack the drawing skills to create original masterpieces, or the hardware to run some of the heavy-duty competition, Arts & Letters may be a very good choice. It would not be an appropriate tool for serious illustrators or designers, however.

CorelDRAW 4.0

This new version of CorelDRAW is loaded with more features than ever before. I thought CorelDRAW 3.0 had more tools that anyone could reasonably hope to master, but 4.0 has added a stack more. The fact that the software is now delivered on two CD-ROMs gives some indication of how feature laden this program is. On the CDs there are 750 PostScript and TrueType fonts, 18,000 clip-art images, over 5000 symbols, plus a sophisticated image editing program (PhotoPaint), scanning and tracing tools (including OCR), an improved version of the CorelCHART graphing program, an image management program, presentation software, and a brand new animation creation program, CorelMOVE. It's a positively dizzying selection. Because of the limited space available, I'm going to concentrate on CorelDRAW itself, but it has to be said that the bonus goodies bundled with it are way ahead of anything the competition offers.

Much of CorelDRAW 4.0 will be familiar to users of Version 3.0. Interface features such as the excellent roll-ups (mini-menus that can be rolled-up when not in use, to keep the screen clear) have been retained and enhanced; almost every major CorelDRAW feature has been implemented via roll-ups in Version 4.0.

There are two major new features, powerlines and contours. The first are cal-



CorelDRAW's new Powerline tool allows the creation of a wide variety of calligraphic curves and lines. Also shown (in the box) is one of the new fractal fills, a variety of unusual textures and patterns which you can customise to your own needs

AT A GLANCE

CorelDRAW 4.0

Distributor: Webster & Associates
Phone: (02) 975 1466
Price: $799
In short: Yet more powerful additions to an already powerful program. With its endless new features, CorelDRAW is well on the way to be the one program that does everything. The two main criticisms that could be made are that Corel has neglected basic features of the core program while concentrating on add-on products; I'd be willing to bet that 99 out of 100 users would have been happy to sacrifice some of the add-ons in exchange for having the core product sped up. The other criticism of what is otherwise a very strong product, is the host of minor bugs in the first version to ship; exactly the same problem occurred with CorelDRAW 3.0. There is now a free patch available which fixes many of them, but with future versions of CorelDRAW I personally won't be paying hundreds of dollars for an upgrade until the bug-fix is shipped.

ligraphic lines, with a variety of styles and nib shapes, which can be drawn with the mouse, but really come into their own if you have a pressure-sensitive drawing tablet. Contours are simply even borders that can be added inside or outside shapes of any complexity, including text. However, in the first shipment of Version 4.0, the contours feature had a bug in it which was profoundly irritating; it refused to let me set specific values for either the gap between contour lines, or for the number of lines. The manual offered no guidance on why this occurred (once I'd found the correct page — there's no entry for 'contours' in the index), nor was the online help any assitance. As a result what should have been any a time-saving feature was useless. Corel has now shipped a revision (4.0b) which fixes this problem and a number of others which have been discovered, but it's a shame that — as with Version 3.0 — they should need to patch the product so soon after shipping.

In most other areas CorelDRAW has been improved. For example, bézier curve editing — which was already very good — has been further enhanced. When you double-click on a bézier control point (BCP) you get a roll-up which allows you to join or break points, or modify the type of point. Corel has also added a new 'elastic mode', which can be selected via the roll-up; normally when you move several BCPs together they remain exactly the same distance and angle from each other, but with elastic mode selected they move in proportion to each other to preserve the character of the curve. It's a feature that's much easier to use than describe, and one which will be very useful.

Text handling, one of Corel's traditional strengths, has also had new features added — particularly designed to allow full-blown DTP and page layout — but handling even a single line of type is now so woefully slow that only a devout masochist would attempt to design even the simplest page of type in CorelDRAW. This seems to be a problem common to all the high-end drawing programs (Designer and Illustrator are almost as bad), and is one that I'd suggest the manufacturer needs to address very urgently. However, Corel does retain some excellent text-handling features, such as interactively editing kerning using the mouse.

Another irritating bug in CorelDRAW is that the measurements shown on the status line at the top of the screen have suddenly become inaccurate in this version. With the grid set to 1 pica and 'snap to grid' on, I tried drawing a square exactly 30 picas wide; the status line insisted that the square was 30.01 picas wide. The problem only seems to occur with the pica measurement system, not with inches or millimetres, but it hasn't been fixed by the patch.

CorelDRAW 4.0b

SUITABILITY TO TASK	
Learning to draw	FAIR
Technical & precision illustration	EXCELLENT
Desktop publishing & layout	GOOD
Full-colour illustration	EXCELLENT

CorelDRAW has lost a bit of ground to Designer when it comes to 3D tools, an area where Corel had the clearest lead in Version 3.0. The extrude and perspective tools in Version 3.0 have been improved slightly but are basically unchanged. You can't draw a 3D shape, such as a cube, in one movement (as you can in Designer) and your ability to realistically light a 3D shape is much more limited than in Designer. These would only be significant issues if you do extensive 3D work, but if that's the case, it may be a reason to defect.

Designer 4.0

US *PC Magazine* recently described Designer as "an illustration tool with the soul of a CAD program"; a good description of a program which combines strong drawing tools with an unusually high degree of precision. Designer's weakness used to be its interface, which was awkward to use and had an old-fashioned feel to it (partly because Designer has been running under Windows longer than any of its rivals). This new version has a completely new — and dramatically improved — interface; in fact the whole program has been re-written. Designer 4.0 is an upgrade to 3.1 only in the sense that a Jumbo Jet is an upgrade to the Wright Brothers monoplane — the differences completely overshadow any family resemblance.

There are two main areas of improvement in this version of Designer; existing tools have been made easier to use, and new ones have been added. Considerable care has gone into both and the results are very impressive.

To make Designer's existing set of powerful, precise tools easier to use, the interface has been completely re-designed. Clicking the right mouse button, for example, produces a simple menu that offers instant access to common functions (such as re-arranging layers or grouping objects). This menu changes according to context, so right clicking when editing text will change features such as font or point size.

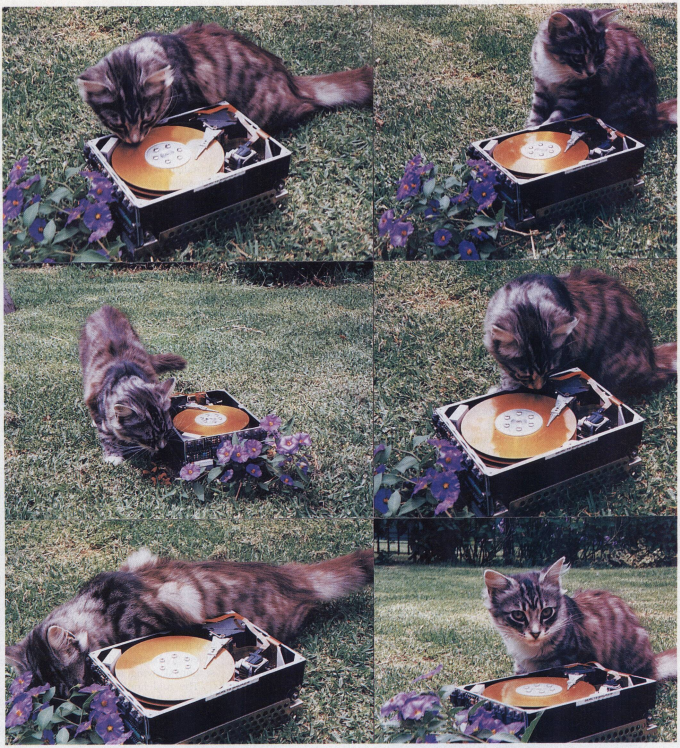
Designer works hard to adapt to the way you want to work. For example, you can choose to draw interactively, by dragging with the mouse, or you can opt to type exact dimensions and coordinates into a dialogue box. Designer also allows you to use either method when transforming objects (by moving, skewing or rotating them, for example). You can also customise Designer by adding or removing tools from the toolbox.

In addition to improving access to all its old tools, Designer has added some very impressive new ones; concentrating on 3D tools, which are now unrivalled. For ex-

AT A GLANCE

Designer 4.0

Distributor: Micrografx
Phone: (02) 415 2642
Price: $795; upgrade $245
In short: A stunning improvement to an already impressive program. Designer's 3D tools are the best of any of the programs reviewed, and all its tools have been well-implemented to make them easy to use. Only the program's slowness and greed for system resources may prevent it from taking over CorelDRAW's spot as the number one Windows drawing program. Yet, despite these fairly minor problems, Designer is a very strong and impressive program; if Micrografx can make a few minor improvements it will have a killer on its hands.



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Micrografx Designer 4.0

SUITABILITY TO TASK	
Learning to draw	FAIR
Technical & precision illustration	EXCELLENT
Desktop publishing & layout	GOOD
Full-colour illustration	EXCELLENT

ample, Designer is the only program reviewed here that allows you to draw 3D shapes with a single mouse action; cubes, spheres, cones, pyramids and cylinders can all be created in one movement — as easily as drawing squares or ellipses. Even more impressive is Designers ability to 'sweep' a line to transform it into a solid object.

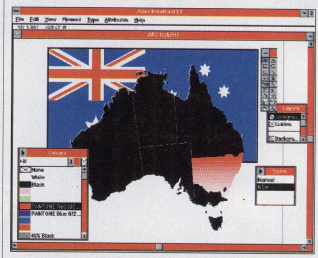
The resulting objects, however, are not simply several 2D objects, grouped together to create a 3D effect (as when a 2D shape is extruded in CorelDRAW), but genuine CAD-like 3D shapes that can be rotated in all three dimensions. Realistic lighting effects can also be added either to single or multiple objects. Other CAD-like features include the ability to annotate, name, store and list individual objects.

Like its main rival, CorelDRAW, Designer now bundles hundreds of free fonts (Type 1 and TrueType formats), mountains of clip art and two free programs; a good bitmap editing program called PhotoMagic and a powerful colour-separation utility called SmartSep (both can be launched from within Designer). You'll need a CD-ROM player to get access to many of the fonts and clip art, but with CD-ROM prices falling every week they'll soon be standard equipment.

All this power however, makes heavy demands on your computer. I kept getting 'Low System Resources' messages, even with relatively simple 3D drawings open, and once or twice during review Designer crashed completely. These problems are partly caused by the way Windows 3.1 handles system resources, and hopefully they'll disappear when the next version of Windows ships (supposedly early next year). However, Designer places heavier demands on the computer than any of the other programs reviewed, perhaps not surprisingly, since it has the most features.

You will need a powerful computer with plenty of memory to run Designer, and even then you'll require plenty of patience to create complex drawings. Designer monopolises system resources, making the use of OLE relatively difficult, since it's hard to have a large program (such as PageMaker or Ventura) running simultaneously. Designer is also slow, even on the powerful systems used for this review. However, these problems can be improved by adding extra RAM; I noticed a significant difference on a machine with 8M of RAM and one with 16M — no doubt 32M would be even better.

Unfortunately, there were a couple of other minor problems with Designer; selecting objects is not as easy as it should be — a surprisingly basic fault to have been allowed in a final release version of a program. These flaws are fairly minor and in most respects Designer is a very impressive program. One word of advice; if you are upgrading from an early version of Designer, remove it completely before installing Version 4.0; you will have a few problems if you don't.



FreeHand also includes good-quality clip art and a powerful selection of professional tools, yet its simple onscreen tutorial and well-designed documentation makes it one of the easiest drawing programs to learn

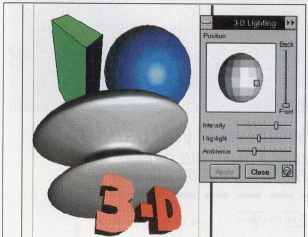
FreeHand 3.11

Installation is relatively quick and easy, but for some strange reason FreeHand comes on fifteen 720K disks (only Arts & Letters, with 17 disks, is more cumbersome). Surely most people with a machine powerful enough to run FreeHand will have a high-density disk drive? There is also no CD-ROM with this version.

The documentation is up to the usual, very high, Aldus standard, and there is an interactive onscreen tutorial which is very well-designed and easy to use. The Getting Started guide even introduces novices to basic Windows concepts and some of the useful Windows accessories (such as the Control Panel). A newcomer, who knew nothing about drawing programs and almost nothing about Windows, would certainly be up and running faster with Freehand than any of the other programs reviewed here.

All the basic drawing tools are present and are well implemented, and all of them allow precise measurements, percentages, etc to be typed in via a dialogue box. There is a 'Move' . . . dialogue box which allows you to type in exact distances to move an object or objects, and similar commands for scaling, skewing, rotating, etc.

The guidelines, alignment and grid options are all very easy to use. FreeHand has no 3D drawing tools to speak of. Even the basic 'extrude' function is missing and there is certainly nothing to compare with Designers CAD-like 3D drawing, so if your drawing needs include 3D work, Freehand will make life too complicated for you. On the other hand, if you don't need to do 3D work, Freehand runs faster, and is easier to learn and use, than its more feature-laden competitors.



Designer 4.0 has the most impressive 3D tools of any program reviewed here. The grey 'cotton reel' shape has been created by sweeping a single curve; the resulting 3D shape is a true solid which can be rotated in all three dimensions and have realistic lighting added to it using the dialogue box on the right

Aldus Freehand 3.11

SUITABILITY TO TASK	
Learning to draw	EXCELLENT
Technical & precision illustration	GOOD
Desktop publishing & layout	POOR
Full-colour illustration	EXCELLENT

Freehand al-

lows the user to define and name styles to help speed up drawing and achieve consistency; you can define line and fill attributes and screen attributes, but that's all. There are no styles for text, however, which would be a major drawback for anyone who needs to do flowcharts and similar text-based work, but it is possible to save object styles as part of a template for re-use for a series of drawings.

Text handling is generally fairly basic. Text can only be imported via the Windows Clipboard and loses all its formatting and attributes in the process. There is also no spelling check (although how beneficial this is in any program, least of all a drawing program, is a moot point). You can only create single-page documents in FreeHand and there are no provisions for column guides or other page layout tools. However, the implementation of text formatting via the mouse is very clever; adjusting letter spacing, word spacing, leading text-wrapping and scaling is simply achieved by using the mouse — dragging on different parts of the text box, while holding various keys. FreeHand also gives you instant access to various common text special effects (drop shadows, outline and inline text) via the Text menu.

There are keyboard shortcuts to repeat the previous transformation, duplicate, clone, and to invoke the various drawing tools. All these are clearly summarised on the Quick Reference Card; another example of the high-quality documentation you can expect from Aldus.

Unlike some of its competitors, Freehand is just a drawing program; there are no additional programs bundled with it. The clip art is of a high quality (the maps and flags are particularly good), but there isn't much of it. However, it does have its share of original and well-implemented features. One I particularly liked is that you can add invisible, descriptive notes to objects. This is particularly useful if you're producing colour illustrations on a monochrome monitor — the notes can remind you which colours various objects will print.

AT A GLANCE

FreeHand 3.11

Distributor: Aldus Software
Phone: (02) 418 8488
Price: $995
In short: FreeHand 3.11 looks a bit primitive when compared to CorelDRAW or Designer, which are both in their fourth versions. Users who want to produce very complex 3D illustrations, or who need integrated scanning and bitmap editing tools, will find FreeHand completely inadequate.

However, complete beginners and those with modest drawing needs will find FreeHand quicker and easier to learn and use than any of it competitors, but it still has enough features to complete the vast majority of common drawing tasks. Ironically, FreeHand's lack of features gives it another advantage over its competitors; it is easier to install and runs on less-powerful machines.

Version 4.0 of FreeHand has been announced yet, but it's a fair guess that one is on the way; if Aldus is careful to build on its strengths and avoid the mistakes Corel and Micrografx have made, Freehand could be a very attractive proposition.



Summary of features professional drawing programs

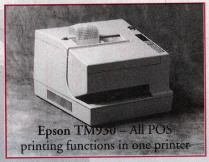
	FreeHand 3.11	CorelDRAW 4.0	Designer 4.0	Illustrator 4.0	Arts & Letters 3.12
General features					
Tutorial: on-line/book	●/●	❍/●	❍/●	m/●	l/●
Context-sensitive help	●	●	●	❍	●
RAM usage when launched	1.3M	2M	4.5M	2.5M	0.5M
Systems resources used to launch	8%	8%	17%	10%	4%
Open multiple drawings	●	❍	●	●	❍
Multi-page drawings (max. pages)	❍	● (999)	● (?)	❍	★[1]
Maximum no. of layers	Unlimited	Unlimited	32,000+	0	0
Maximum page size (cm)	101.6 by 101.6	76.2 by 76.2	1000 by 1000	45.7 by 45.7	★[1]
Hide/lock layers or objects	●	●	●	●	●
Templates/master pages	●	●	●	❍	●
Multiple undo/redo (levels)	● (99)	● (99)	● (100)	1	● (9)
Support OLE	❍	●	●	❍	❍
Illustration tools					
Basic 2D shapes[2]	●	●	●	●	❍
Draw shapes by typing co-ordinates	●	❍	●	❍	❍
Draw shapes either from centre or corner	●	●	●	●	❍
Basic 3D shapes[3]	❍	❍	●	❍	❍
Gradient fills/blends	●	●	●	●	●
Named object styles	●	●	●	❍	❍
Alignment tools					
Snap to grid/rulers	●	●	●	●	●
Snap to other objects	●	●	●	❍	●
Snap to user-defined guidelines	●	●	●	●	❍
Specify co-ordinates	●	●	●	❍	●
Basic manipulation tools[4]					
Move	●	●	●	●	●
Skew	●	●	●	●	●
Rotate	●	●	●	●	●
Flip/mirror	●	●	●	●	●
Duplicate	●	●	●	❍	●
Group/combine objects	●	●	●	●	●
Advanced manipulation tools[4]					
Warp/envelope	❍	●	●	❍	●
3D extrude	❍	●	●	❍	❍
3D sweep	❍	❍	●	❍	❍
Text tools					
Adobe Type 1 fonts	●	●	●	●	●
TrueType fonts	●	●	●	❍	●
Point sizes	1-3000pt	1-2160pt	2-3000pt	0-1296pt	1-250pt
Import text from clipboard	●	●	●	●	●
Import text files	❍	●	●	●	●
Kerning/tracking/leading	●	●	●	●	●
Specify precise spacing	●	●	●	●	●
Curve/warp text to path	●	●	●	●	●
Advanced text features					
Bullets/drop caps	❍	★	●	❍	❍
Tabs/indents	❍	●	●	❍	❍
Hyphenation	❍	●	●	❍	❍
Spell checking	❍	●	●	❍	❍
Wrap paragraph text around objects	❍	★[5]	●	★[6]	❍
Named text styles	❍	●	●	❍	❍

1. The number of pages appears to depend upon the maximum page size supported by the target printer; if your printer supports A3, for example, and you define your page as A5, Arts & Letters allows you to have several pages in a drawing. The documentation is extremely unclear on this point however.
2. Basic 2D shapes are ellipse, square, polygon, straight line, freehand curve and bézier curve. A star indicates one or two are missing, an empty box means three or more are missing.
3. Basic 3D shapes are sphere, cube, cone and pyramid.
4. A star means the action can only be performed with the mouse, not by typing precise measurements/co-ordinates. A full box indicates either method is available.
5. You can wrap paragraph text around an object in CorelDRAW by manually editing the text container; you can't do it automatically.
6. As with CorelDRAW, Illustrator allows you to place text in a container and then edit the container's shape, but not to perfom automatic text wrap.

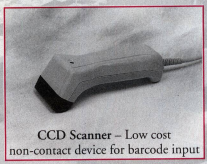
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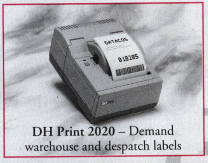


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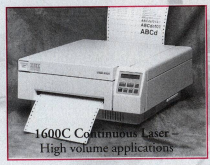
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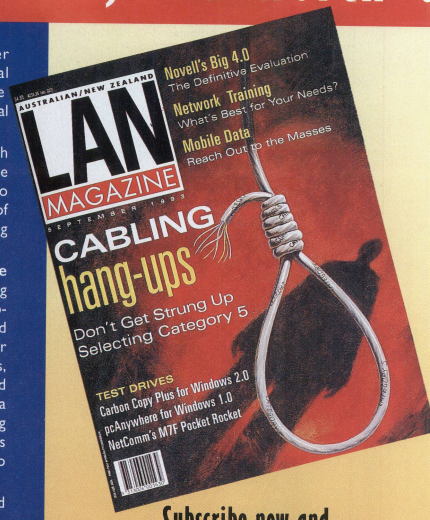
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W Consolation prizes: Five LANalyzer for Windows. Valued at around $2,600 each.

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☐ LAN Manager/Ni Advanced Server
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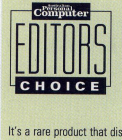
BY GAYLE C. EHRENMAN

The PC no longer needs to play stepsister to the Macintosh.

Has the Mac met its match?

A YEAR AGO, WE BEGAN OUR IMAGE-EDITING REVIEW by asking whether the PC could replace the traditional photo darkroom when it came to image editing. With victory over the darkroom pretty well established, this year we turn our attention to other challenges. We take on the Macintosh – the heretofore undisputed champ of PC-based image editing.

When it comes to image editing – that is, the digital manipulation of photographic-quality images on the PC – there's little these days that the Macintosh can offer that the PC can't match, and probably for less money, too. Certainly when it comes to hardware power and performance, the PC can more than equal the Macintosh, while leaving more pennies in your pocket. The minimum system required to adequately work with images on a PC is a 386/33 with 4M of RAM, a 24-bit graphics adaptor, and a colour monitor, which will cost less than $2550. The same sort of horsepower on the Mac platform, in the form of a Macintosh IIvx, will cost $3400. And thanks to the rapid evolution of PC hardware and the availability of Pentium-based PCs, that gap won't get any narrower until the release of the PowerPC.



- **Adobe Photoshop for Windows, Version 2.5**
- **PhotoMagic for Windows, Version 1.0**

It's a rare product that distinguishes itself in its first version, but such is the case with both of our Editors' Choice winners. Adobe Photoshop ($1299) may carry a 2.5 version number, but this release marks the first appearance of the Macintosh stalwart on the Windows platform. And although Micrografx's PhotoMagic for Windows ($145) carries a 1.0 version number, it's as polished as any seasoned veteran.

Whereas Photoshop caters to the professional market, PhotoMagic targets the business user. Both packages do an admirable job of meeting the needs of their intended users.

Photoshop's powerful filters, precision selection tools, and customisable paintbrushes give pre-press and photography professionals the tools they need for intensive image-editing tasks such as creating composite images and editing directly in CMYK.

Part of what sets Photoshop apart from the rest of the image-editing pack are its abilities to create and save eight-bit selections and to save these selection areas as reusable masks — or alpha channels — attached to a particular image; and each Photoshop image can contain up to 16 of these eight-bit channels. The package's superior image-enhancement filters, colour separation capabilities, and wealth of file-conversion options make image-production tasks easy. Beginners beware, however: this package may be powerful and flexible, but it's not easy to learn.

PhotoMagic, on the other hand, offers a truly elegant, easy-to-master interface and a strong set of basic image-editing tools perfect for the business user who needs to retouch some photos or manipulate images before exporting them to a desktop-publishing application. Ease-of-use features such as the thumbnail-based ImageBrowser and EffectsBrowser go a long way toward helping business users track and manipulate their images.

A full array of selection tools and a wider selection of draw and paint tools than can be found in many professional-level packages, including natural-media brush styles and a colouriser tool, make it easy to go from business user to creative artist with a few mouse clicks.

An honourable mention goes to Micrografx's Picture Publisher ($795) which brings object-oriented image editing to professionals and business users respectively. Picture Publisher offers many of the same ease-of-use features as its business-level sibling, while giving professional users the powerful masking and colour handling they require. Its object-oriented approach allows parts of the bitmap image to be treated as separate floating selections, making it easy to perfect composite images. Its only shortcomings are an incomplete implementation of Bezier tools and some limitations in working with CMYK files.

While ImageWizard gives business users a strong set of masking and paint tools, it is most notable for its use of objects: everything but the background of an image is treated as a separate object here. The package is a bit weak on colour handling and lacks some of the standard effects — such as a motion blur filter — that you'd expect to find in an image-editing package.

In the past, the Mac has held the lead in image-editing software. Adobe Photoshop for the Macintosh made all PC-based image-editing software pale by comparison. Now the tide has turned. Photoshop, which, along with Fractal Design Corporation's ColorStudio, pioneered the field of electronic image editing, has now made its way over to the Windows environment. The Windows package has everything the Mac package has always offered production professionals except some of the third-party add-ons. But it's only a matter of time until these are also available on the PC platform. (For more on the Macintosh version, see 'The Photoshop culture: A look at the Mac leader,' on page 172.)

The PC also offers a far greater selection of image-editing tools that appeal to a far more varied audience. Image editing on the PC is clearly a two-tiered market, with products for the high-end professional user as well as for the casual business user. While Adobe Photoshop and Micrografx's Picture Publisher push the envelope with advanced features such as colour separation, CMYK editing, and the ability to work on very large files, Micrografx's PhotoMagic for Windows breaks new ground in ease of use for mere mortals. These business-use packages are surprisingly rich in features, including the ability to layer objects.

The PC marketplace hasn't just been keeping pace with the Macintosh environment — it's been developing by leaps and bounds. Aldus PhotoStyler was in the midst of a major revamping at the time of this review; the next release should be available by the time you read this. Altamira Composer was also in beta as *APC* went to print, but it should be in a software store near you at this time.

To be included in this review, a product had to be a dedicated image-editing package able to work with 24-bit colour images, have direct support for a standard array of desktop scanners and offer masking tools and special-effects filters.

Breaking the bottlenecks

The field of image editing is marked by more than just new products. There are new approaches, too — ones that tackle large, complex, and sometimes unruly images.

While you may need to have a 20M image displayed onscreen, chances are you only need to work on a small portion of it at any given time. To cut down on memory and time-intensive procedures like zooming and screen redraws, some packages, such as Picture Publisher, add ways to edit a lower-resolution, smaller-file-size version of a high-resolution behemoth of an image. Whatever changes made can be recorded as a macro to be applied to a high-resolution image. If you must edit the high-resolution version, Picture Publisher's FastBits option allows you to choose only a portion of a larger image to edit.

Making adjustments to an entire image, be it a global filter change or a remapped colour value, is another bottleneck. Part of the problem stems from not knowing exactly what you'll get when you increase the amount of, say, red in an image, and the rest of it stems from waiting for the PC to recalculate the necessary values and then redraw the altered image. To take some of the guesswork out of the alteration process, PhotoMagic and Picture Publisher offer preview thumbnails for image adjustments and filters. Push one of those adjustment sliders and you can quickly see the change on the thumbnail; if you like what you see, choose Apply and the image is updated.

More dramatic than either of these time savers is the new object-oriented approach that's spreading throughout the world of image editing. Taking a page from vector-based graphics, the object-oriented approach allows you to treat pieces of your bitmap graphic as floating objects that can be moved around infinitely and stored for use in other images.

This vector-type capability cropping up in bitmap graphics packages points to another trend — the convergence of paint, image-editing, and illustration software packages. While a package such as Fractal Design Painter possesses many of the same capabilities as the image-editing packages included in this review, its primary use is for creating natural media paintings. CorelDRAW, on the other hand, began as a vector-based illustration package, but has



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Suitability to task: Image editors

The nine packages in this review are all intended to do essentially the same things: repair and improve scanned-in photos. They break down into two categories, however: high-end, professional-level image editors and business-level image editors. Depending on what you need an image-editing package for, a product from either group may meet your needs.

We evaluated each package by five sets of criteria to determine which category it belongs in — professional or business-level — and how well it performs on a variety of tasks.

Photo retouching lies at the heart of all image-editing tasks. To excel in this category, a product must offer good scanner drivers (at the very least, a reliable, functional Twain driver); flexible tonal adjustment capabilities for enhancing the highlight, midtone and shadow of an image; and effective global filters such as despeckle and sharpen. The package must also offer a useful, basic set of selection tools that allow you to specify carefully the area of a photo you want to change. Finally, it should offer access to attractive fonts for annotating your photo.

For **creative editing**, a package must offer, at the least, the tools needed for photo retouching. Beyond the basic assortment of selection tools, a package needs to offer area and colour-masking capabilities, a well-chosen set of special-effects filters, and a robust set of painting tools.

In **professional editing**, we're looking at those extras that separate the business-level packages from the professional-level powerhouses. To fare well in this category, a package must offer the capabilities an imaging professional requires, including the ability to perform more than just eyeball calibration on the monitor, printer and scanner; to work with multiple, high-resolution images; and to separate an image into its CMYK channels (the ability to edit in CMYK colour space is greatly preferred). In addition, professional-level packages should allow you to work in a separate mask channel and save paths, masks and PostScript outlines, and to produce colour separations.

Output encompasses a package's ability to produce both printed and electronic output and the attractiveness of that output. When it comes to printed output, a package should be able to print quickly, easily and accurately to the chosen output device, be it a mono LaserJet printer or a PostScript-compatible image-setter. Quality and flexibility are what count here. The key to success at electronic output is the ability to create an attractive image that will be viewed only onscreen, perhaps as part of an electronic slide presentation. Important considerations include the ability to resample an image down to a lower resolution, to compress images, and to perform palette optimisation and colour reduction (say, from 16.8 million colours to 256 or from colour to halftone).

Product name	SUITABILITY TO TASK
Photo retouching	POOR
Creative editing	FAIR
Professional imaging	GOOD
Output	EXCELLENT
Image management	N/A

Image management encompasses all the extras that make moving, renaming, and generally controlling your image files easy. Some of these extras include image thumbnails and albums; the ability to catalogue, archive and delete files; and the ability to obtain information easily about the image you're working on. The ability to import and export images in a variety of file formats is also a key consideration.

grown to incorporate a series of task-specific modules, including Corel PhotoPaint, which is something of a hybrid image-editing/paint package.

Where will it all end?

As 24-bit graphics and photo-realistic images become more a part of our workday computing lives, image-editing software will become more of a mainstream tool. Finally mature, the market is breaking down into two tiers: professional and business. At the professional level, you'll find packages like Photoshop, PhotoStyler and Picture Publisher. The much more crowded business level includes PhotoFinish and PhotoMagic for Windows among its ranks.

Despite what a package may call itself, what sets it firmly in one category or the other is functionality. Business-level packages should make it easy to do the things business users require, such as palette optimisation and simple retouching.

Professional-level packages require a far more complex set of tools. Here, the emphasis is on flexibility. Where business-level packages need only work in RGB colour space and provide a basic selection of masking tools, professional-level packages must allow editing of images directly in CMYK colour space, handle large images efficiently, and give you sophisticated masking capabilities.

Keep in mind, though, that all of this power comes at a price. Professional-level packages cost anywhere from $500 to $1200 more than their business-level siblings, and they are far more difficult to learn. If you need the sophisticated tools they offer, they're a great investment. But if all you need to do is clean up some photos for your newsletter, you're better off choosing one of the less expensive, easier-to-master, business-level packages. Read the reviews and study the 'Summary of features' table to determine which package best suits your needs. Regardless of which package you choose, one thing is certain: the key to more attractive images lies within your reach — and within your PC.

Adobe Photoshop for Windows

By Luisa Simone and Maureen Jones

Adobe Photoshop (along with ColorStudio, now distributed by Fractal Design Corporation) revolutionised digital pre-press on the Macintosh. Photoshop's powerful filters, precision selection tools, and customisable paint brushes literally defined image processing on the desktop. Now this $1299 professional-level program is available to Windows users. So similar are the Mac and PC versions of Photoshop that users can switch between the two environments without losing a beat or compromising their aesthetic standards.

Photoshop's roots are firmly planted in the world of traditional pre-press shops and photography studios. For example, users are expected to be familiar with specialised terminology (such as dodge and burn) and difficult concepts (such as gamma correction and under colour removal). These tools and functions inspire confidence in professional users, but are undeniably intimidating for novices.

One of the true tests of an image-editing program is the flexibility of its selection tools. A brief tour of Photoshop's toolbox reveals standard rectangular, elliptical, and freeform (a.k.a. lasso) marquees as well as the now-famous magic wand. But the deeper you dig into the program, the more selection options you discover. While most programs offer a feather option to soften — or antialias — the edges of a selection area, only Photoshop includes a Defringe command to remove the soft edges of an antialiased image. This is a subtle but invaluable feature that results in a cleaner picture when pasting an antialiased selection into a new background. For example, during testing in *APC* Labs, the Defringe command quickly cleaned up the not-quite-black pixels that marred the outline of the Guy.TIF image and his attache case in our composite image.

Photoshop's selection areas utilise eight bits of data, which means that they can

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AT A GLANCE

Adobe Photoshop for Windows, Version 2.5

Distributor: Infomagic
Phone: (02) 930 3900
Price: $1299
Requires: 386-based PC or better, 4M RAM (16M recommended), 40M hard disk space (200M recommended), 256-colour display (24-bit accelerated graphics display recommended), DOS 5.0, Microsoft Windows 3.1, mouse. (A Microsoft Pen Windows-compatible pressure-sensitive digitising tablet is recommended.)
In short: Photoshop now reigns supreme among image-editing packages for the PC. Its variety of paint tools and support for pressure-sensitive digitising tablets will spark your creativity. Its impeccable colour-separation and file-conversion capabilities make Photoshop a must-buy for image-editing professionals.

create not only feathered edges but 256 levels of opacity/transparency. Moreover, you can save a selection area as a reusable mask — or alpha channel — attached to the current image. For example, it was easy to make the daytime sky merge gradually into the nighttime sky in our test image by using a gradient-filled eight-bit alpha channel to mediate the paste operation. Unlike other programs, which force you to save eight-bit masks as an external file, each Photoshop image can contain up to 16 eight-bit channels, all of which are controlled internally through the Channels palette. Typically, the primary image data will occupy three (for RGB) or four (for CYMK) channels, leaving 12 or 13 alpha channels available for image-editing masks.

Working with vectors

One of Photoshop's most unique features is its ability to utilise vector — in addition to raster — information. Using the Bezier drawing tool, found on the Paths palette, you can draw and edit freeform curves. This allows you to develop outlines with the precision normally found only in object-oriented drawing programs (like Adobe Illustrator). Once you have created a path, you can stroke it (drawing a perfectly smooth line), fill it (creating a freeform shape), or convert it into a selection area or mask.

Photoshop can also export and import vector curves in the form of editable Encapsulated PostScript (EPS) files. This feature was especially useful when we added the text phrase 'Time is Money' to the test image. Of course, Photoshop can directly access, scale, and antialias any Type 1 or TrueType font installed under Microsoft Windows, but its text-manipulation functions are limited to simple formatting options such as leading, alignment, and boldfacing. Therefore, it was far more efficient to align the text to a curve within Adobe Illustrator and then to import the final design into Photoshop as a mask.

The *APC* Labs test suite provided a number of opportunities in which to employ Photoshop's filters, which run the gamut from production tools to special effects. For example, enhancing the daylight sky required us to use both the brightness and colour balance filters. We easily created the accelerating plane by using the motion blur filter.

We were especially impressed with the hard-working, always reliable image-enhancement filters. The ability to set the highlight and shadow points, for example, mimics traditional pre-press techniques and consistently produces images with a wide dynamic range. And just about every image-editing filter comes complete with a Preview option, taking much of the guesswork out of fine-tuning the tonal and colour values in a picture. If the idea of previews appeals to you, you'll love the new Variations dialogue box, where you can view thumbnails with different colour, saturation, and brightness levels. Just click on the preview that looks right and the program makes the changes automatically.

Though the 40-plus special-effects filters all worked as advertised, we found some room for improvement here. Although the Undo command is available to reverse a special effect, an added bonus would be the offer of a preview option. Further, som of the large images generated memory problems, because several of the more computationally intensive effects (notably the Distort filters) must be executed entirely in RAM — no virtual memory allowed. The software's average speed for performing a motion blur on our 64M test-bed was 43.73 seconds, compared with 103.03 seconds on our 16M machine. In fairness to Adobe, Photoshop had no trouble applying these same filters to smaller images or to selected areas of a larger image that fit within the 16M of RAM installed on our test-bed machine.

Adobe Photoshop for Windows

SUITABILITY TO TASK

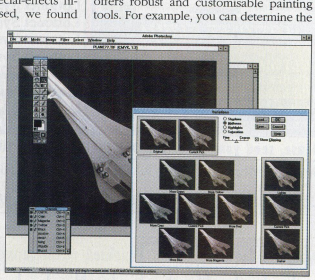
Photo retouching	EXCELLENT
Creative editing	EXCELLENT
Professional imaging	EXCELLENT
Output	EXCELLENT
Image management	N/A

Photoshop has cloning and editing tools that made short work of retouching a damaged grey-scale photograph. For example, the clone tool — especially with the nonaligned and antialiasing options — did a superb job of repairing several large scratches on the original image by allowing us to copy clumps of leaves and maintain a naturally random look with ease. Likewise, we took complete advantage of Photoshop's ability to flip, rotate, skew and add perspective to a selection area in order to patch a section of the sidewalk.

A whiz at colour

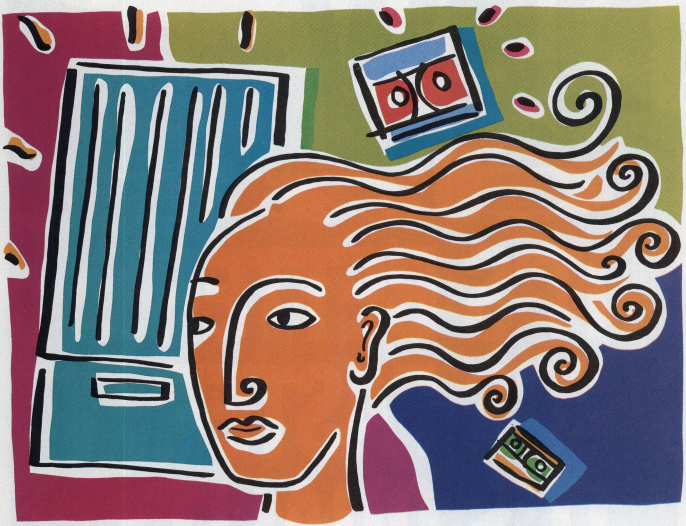
It is all too easy to overlook one of Photoshop's most powerful image-editing features — the ability to alter images using different colour models, such as RGB, CYMK, or L*a*b*. So if you use a 32-bit scanner to generate CYMK files directly, you don't have to lose information and convert the image to 24-bit RGB files. Likewise, working with L*a*b* (a device-independent colour model developed by the Centre Internationale d'Eclairage) enables the transfer of images from platform to platform or to different output devices and suffer only a minimum of colour shift.

For those artists who prefer to create pictures from scratch, Adobe Photoshop offers robust and customisable painting tools. For example, you can determine the



Photoshop's flexibility includes detailed previews of hue and saturation adjustments

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Feature	Conner Tape•Stor 250 MQT w/Backup Basics Software	Conner Tape•Stor 250 MQT Plus w/Backup Exec Software
Drive Size	1" Industry Standard	1" Industry Standard
Free 3M Tape	√	√
DOS/Windows Software	√	√
2-Year Warranty	√	√
Full Cartridge Insertion	√	√

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size and shape of the brush, set transparency and antialiasing levels, or choose how the brush will respond to a pressure-sensitive stylus. You can even configure the paintbrush to fade out in the same way that a real brush would run out of ink.

When it comes time to export your images for use in other applications, you'll discover that, once again, Photoshop provides you with lots and lots of options. The wide range of supported file formats includes standards such as .BMP, EPS, and TIFF, as well as high-end and emerging formats such as JPEG, Pixar and Targa.

Equally important, Photoshop also allows you to optimise images for specific applications, allowing desktop publishers to customise the GCR (Grey Component Replacement) and UCR (Under Colour Removal) maps used for process separations. Television producers can employ the National Television Standards Committee's Colours filter to generate an image that falls safely within the gamut of broadcast video. Multimedia authors and animators can choose from seven different bit depths, four palette-generation techniques, and three different dither patterns when they convert full-colour pictures into the indexed colour files required by most presentation and animation programs.

Photoshop ships with a small selection of plug-in utilities that, for the most part, supply basic functions. Both the Twain scanning module and the JPEG import filter, for example, are implemented as plug-ins. But you can expect to see a host of add-in products that address the needs of high-volume pre-press shops and professional artists.

Two features that are notably absent and sorely missed from Photoshop are an image-management utility and a macro recorder. Right now, it is necessary to rely on the all-too-limited eight-character DOS filename in order to locate and identify images, because Photoshop does not supply a thumbnail preview, an image browser, or a file-search function. And unfortunately, the only way to repeat complex image-editing sequences is to take detailed notes, because Photoshop does not offer macro record and playback functions.

Despite these few caveats, there is only one way in which to describe Adobe Photoshop for Windows: it is an image-editing dynamo. With its superior image-enhancement filters, colour-separation capabilities, and file-conversion options, Adobe Photoshop can easily become the engine that drives your production system. At the same time, its customisable painting tools, endlessly malleable masks, and support of pressure-sensitive digitising tablets can energise any artistic imagination.

PhotoFinish

By John Moore

A co-winner of our Editors' Choice award last year, PhotoFinish from WordStar Atlanta Technology Center is an effective tool for business users who need to perform quick and simple photo retouching on small images without spending a lot of time learning esoteric concepts about working in colour. The $345 PhotoFinish, Version 2.0, is clearly not designed to handle the sophisticated tasks that professional-level products are intended for. And even if you plan to perform only the simple tasks for which PhotoFinish is designed on large files, you would still be wise to look elsewhere.

PhotoFinish features an extensive and informative interface. It presents the user with a three-column (grouped) toolbox that can be ungrouped in order to display the full six columns of tools provided. Included in this toolbox are a colour palette and a Width and Shape workbox, with which to change the size and shape of tools without having to call up a dialogue box. A status bar on the bottom left of the screen indicates the pointer's position on the image and on what tool the pointer is positioned. This is particularly helpful when working in the program's Zoom mode: the status bar indicates the current aspect ratio and what the ratio will be if you click the left or right mouse buttons. Although you are given the status of images as they're loading, no such information is given for effects such as rotate, leaving the user guessing as to how long processing will take.

PhotoFinish features an excellent range of functions in its Image menu, from the handy Remove Spots command in the Filter submenu to wacky special effects like Fisheye Lens or Black Hole, which creates a squeezed effect on your image. One of this package's more unique and valuable features is its Local Undo tool, which cancels changes made since the last time you chose a command or tool. This was particularly useful in our tests when we used the clone tool to retouch the damaged photo. PhotoFinish, unfortunately, doesn't have a Redo command.

AT A GLANCE

PhotoFinish, Version 2.0

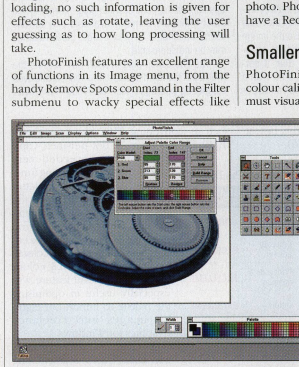
Distributor: Software Suppliers
Phone: (02) 888 1955
Price: $199
Requires: 286-based PC or better (386-based PC or better recommended), 2M RAM (4M recommended), 5M hard disk space (10M recommended), VGA display or better (SVGA display or better recommended), Microsoft Windows 3.x, mouse.

In short: Thanks to its ease of use and flexible retouching tools, PhotoFinish, Version 2.0, should satisfy business users as a low-cost image-editing package. It has an extensive interface and features an excellent range of functions. Just keep in mind that you shouldn't try to push this software too far. It slowed to a crawl when editing high-resolution test images.

Smaller is better

PhotoFinish provides simple monitor colour calibration via colour swatches you must visually match. It offers only minimal gamma adjustment, however. PhotoFinish also supports scanning with Twain.

WordStar says there is no optimal configuration for PhotoFinish — it all depends on the size of the image you're working with. That being the case, smaller images work much better, preferably those of no more than 1 or 2M. Performance on our tests was as much as seven times slower on our 16M test-bed than it was on our 64M machine (the program took an average of 111.39 seconds to complete the Motion Blur test on the 16M machine, compared with a 15.97-second



PhotoFinish will edit a range of colours either in RGB or HLS for flexible palette optimisation

The Photoshop culture: A look at the Mac leader

BY PAULINE ORES

Until recently, image editing had been the sole province of the Macintosh. The rapid evolution of PC hardware, however, has helped narrow the gap between the two platforms. And now that Adobe Systems has released Adobe Photoshop for Windows, Version 2.5, the boundaries have become completely blurred.

Yes, there are differences between the operating systems and hardware, but the differences between the two platform-specific versions of Photoshop are hardly enough to write about. Running Photoshop on a Mac does offer some inherent advantages, however: Mac files have both a data and a resource fork, and the latter can store information about a file as well as a PICT preview. Many programs can take advantage of this feature to display minipreviews of image files in the 'Open' dialogue window.

While it's generally accepted that a 486 DX2/66 chip is faster than the Mac's 40MHz 68040, that doesn't mean that Photoshop will be faster at all operations on the PC. The Mac's System 7, Version 7.1, is a 32-bit environment capable of benefiting from running 32-bit compiled appliicatons such as Photoshop. Since Photoshop for Windows is a 16-bit applications, mathematical operations like bicubic interpolation that take place when you rotate, resize, or cause the image to be reconstructed are slower on the PC. However, applying filters like Gaussian Blur, if performed in memory on a PC — or on a PC with a fast disk subsystem — may be as much as 20 per cent faster than they are on the Mac.

The two platform-specific versions are in lockstep development and can share binary files — a real improvement over the leapfrog development method used for Adobe Illustrator, where Version 4.0 is only for the PC and Version 5.0 is only for the Mac. The only real difference between the Mac and PC versions lies outside the programs or platforms themselves: Photoshop is not just software, but ground zero for an ever-growing mushroom cloud of Photoshop-related software, hardware, standards and services.

Market acceptance

In the late eighties, when Photoshop first appeared (as Barneyscan XP), desktop image-manipulation offered everyone from novice users to professional photographers to high-end prepress imaging professionals new possibilities. As Photoshop gained market share, developers built their products and services around it.

In addition to its inherent advantages, the popularity and professional acceptance of the Mac version of Photoshop gives that platform — temporarily, at least — the edge on the PC version. Specialised high-end scanner plug-ins and myriad other filters are currently available only to Mac users. Depending on your needs, these features may be indispensable.

The Photoshop plug-in itself has become the Mac input standard for capturing images, and even competing packages such as Aldus PhotoStyler now accept input that is Photoshop plug-in-compliant. PC vendors, whose effort to standardise began before Adobe was even beta testing Photoshop for Windows, standardised on Twain. But PC plug-in support for both input and output is also gaining ground. Adobe has shipped 90 PC plug-in developer kits and expects at least 30 more to ship by mid-year.

With Mac CPUs historically being considerably more expensive than the PC processors, many Mac users have found themselves with slower-than-optimum CPUs. Digital Signal Processing (DSP) boards remedy that situation by speeding up certain CPU-intensive processes, and many Mac-compatible products are available. DSP boards for Photoshop for Windows are not currently available, although several are expected to be released by the end of the year. But not to worry — there is a way around this for PC users. According to Bryan Lamkin, Adobe's senior product manager for Windows, loading up on RAM on the fastest CPU available will accelerate performance regardless of the platform.

It is the very success of the Mac version that will hasten the success of Photoshop for Windows, as well as that of other PC-based image-editing packages. PC users can reach out to technicians at Photoshop-savvy service bureaus, who are experts on the process of making film with the Mac version. PC users can also expect relatively quick support of many of the filters and plug-ins currently available only on the Macintosh.

average on the 64M test-bed, the fastest time of any of the products tested).

PhotoFinish also crashed three times trying to perform a 90-degree rotation on our Car.TIF image. Disabling the program's virtual memory solved that problem for performing this test on the 64M configuration only, although WordStar recommends using PhotoFinish's virtual memory when running Microsoft Windows in standard mode.

Repairing the damaged grey-scale photo in our tests was a snap with PhotoFinish's excellent cloning tool, but it was also painfully slow. Screen previews for adjusting contrast and brightness took much longer than expected. Some tasks, however, such as converting TIFF files to eight-bit .BMP files with a 72-dot-per-inch (dpi) resolution, proceeded very quickly. Another satisfying function is PhotoFinish's palette-editing capability. Under the Palette Range of Colours command in the Options menu, you can adjust single colours, the entire palette, or a range of colours in either RGB or HLS colour mode. This helpful feature was especially useful in optimising the palette to import our eight-bit images into Freelance Graphics for Windows.

Picture Publisher

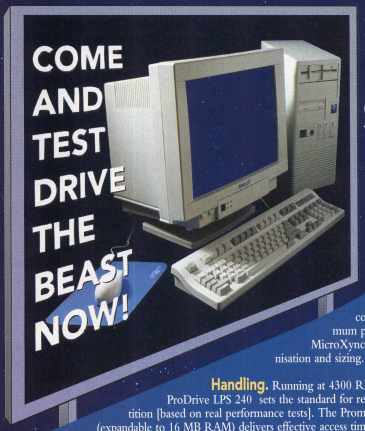
SUITABILITY TO TASK	
Photo retouching	GOOD
Creative editing	EXCELLENT
Professional imaging	EXCELLENT
Output	EXCELLENT
Image management	EXCELLENT

For high-end colour production tasks, such as assembling our CMYK test image, PhotoFinish isn't even in the running. High-resolution images slow the system down to a crawl (in fact, even a 12M file is pushing the envelope). It is not possible to resample the image to a lower resolution without resizing it — changing the resolution does nothing to the file in terms of megabytes. Consequently, we were unable to perform the final section of our tests, which called for the manipulation of large, high-resolution images.

WordStar clearly knows its audience. PhotoFinish's documentation does an adequate job of explaining to beginners what each tool is designed for, and it includes a troubleshooting appendix detailing what to do when common error messages pop up.

Business users should have no problem using PhotoFinish, Version 2.0, for retouching or manipulating small image files. As a low-cost image-editing software package, it is a worthwhile investment, but you should know your limitations when working with this product.

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Picture Publisher

PhotoMagic for Windows

By Marla Milne

The image-editing market divides tidily into two tiers, and Micrografx has them both covered. The $795 Picture Publisher, Version 4.0, is its professional-level tool for image assembly, while the $145 PhotoMagic for Windows, Version 1.0, is the tool for business and casual users. If not for the incomplete implementation of Bezier tools and some limitations in working with CMYK files, Picture Publisher 4.0 would easily stand as the premier Windows image-editing package available for professionals. As a tool for business users, PhotoMagic is without peer.



Picture Publisher's powerful ImageBrowser, with thumbnail images and user-definable albums, compensates for Windows' lack of a seamless interface for file management

Micrografx is targeting Picture Publisher at users ranging from desktop publishers to pre-press professionals. A clean and informative interface combined with good memory management, well-defined retouching tools, and support for CMYK editing provide the foundation for this market positioning. The package provides support for all pixel depths — including black and white for line art, eight-bit grey-scale for monochrome pictures, 24-bit RGB for desktop scanners, and 32-bit CMYK — as well as a wide range of file formats.

Picture Publisher's interface maintains its overall look and simplicity while offering the type of tools professional users require. Variable options for all tools are available through lists, which pull down to reveal the range of selections. Other tool-specific features are toggled on and off by clicking buttons on the ribbon.

A powerful ImageBrowser with thumbnail images and user-definable albums compensates for Windows' lack of a seamless interface for file management. This browser includes Albums, a unique feature that allows you to define collections of files that may reside across networks or locally on multiple volumes; you can open the files in an album, no matter where they reside, and save them to a master list complete with Thumbnails for quick identification and recall. As a result, less time is spent searching through volumes.

Another winning interface design is found in the EffectsBrowser. Placing all the available effects within the same dialogue allows you to apply different effects to the same image, inviting you to experiment freely.

In addition to these features, Micrografx has added two options to speed up the process of working with large images. The FastBits option allows you to select a piece of a large image to open and load into memory for retouching. Any changes made to this chunk are applied to the whole image when you choose Save or Close from the file menu. The handy Low Res Image Open option allows you to open and make global changes to a low-resolution copy of your large, high-resolution file. You can choose the specific resolution for this image; when you have finished working with the image, you record a macro of your changes, and then play this macro back on the full-resolution image.

Layering options

Picture Publisher treats selected elements of bitmapped images as separate, floating selections. You can visually combine images, and you can mask, blend, rotate and scale multiple pasted elements until you are satisfied with the positions, sizes and blends. Then you can commit your edits to the base image. A list of thumbnail images is available in a floating window to identify the separate layers. As layers of an image are created — either through copy/paste or imported from named clipboards — the titled image grows accordingly.

Users familiar with the behaviour of object layers will find their expectations fulfilled; all the usual options are available here, including the ability to move a layer forward or backward, to group layers (which we found useful for performing a matched move such as a perspective distortion on multiple layers), and to edit the colour of the selected object without affecting the rest of the image. Some common commands are missing, however, including align and snap-to-grid.

Picture Publisher features some enhanced masking capabilities that should give users more flexibility when compositing images. The program now supports alpha channels with intuitive editing functions, including one-button user access; Paintable Masks, which allows you to use the paint brush to apply a mask

AT A GLANCE

PhotoMagic for Windows, Version 1.0

Picture Publisher, Version 4.0

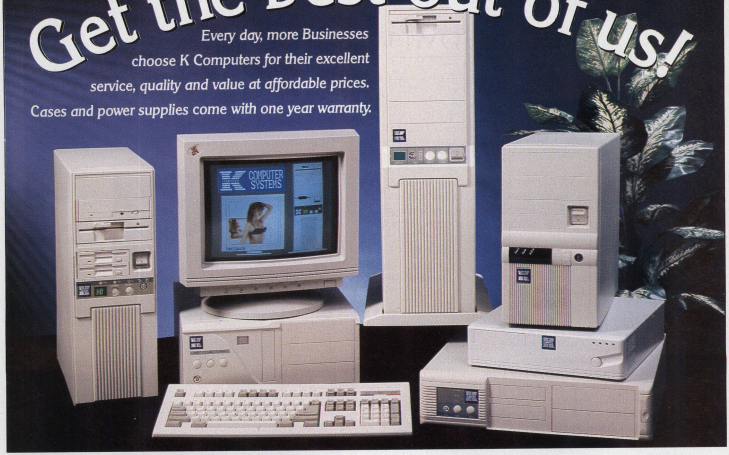
Distributor: Merisel
Phone: (02) 882 8888
Price: PhotoMagic, $145; Picture Publisher, $795
Requires: PhotoMagic: 386-based PC, 4M RAM, 5.3M hard disk space (10.5M recommended), VGA or better display, DOS 3.1 or later, Microsoft Windows 3.1, mouse; Picture Publisher: 386-based PC (486 recommended), 4M RAM (8M recommended), 5M hard disk space (15M recommended), VGA or better display (16-bit or better video card recommended), DOS 5.0, Microsoft Windows 3.1, mouse. (A CD-ROM drive is recommended).
In short: A clean and informative interface, well-defined retouching tools, and support for CMYK editing make Picture Publisher 4.0 a strong tool for professional image editing. Only a few glitches prevent it from being the premier image-editing product in the Windows environment. Business users should stick with PhotoMagic, which not only includes the same clear interface and all the functionality you're likely to need, but also boasts an array of paint tools that can challenge those found in most professional-level products.

PhotoMagic for Windows

SUITABILITY TO TASK	
Photo retouching	GOOD
Creative editing	EXCELLENT
Professional imaging	N/A
Output	EXCELLENT
Image management	EXCELLENT

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How we tested

BY JEFF MACE

To test these packages, we designed a series of tasks that reflect the spectrum of uses for image editing: from typical business-level tasks to professional-level production work.

To evaluate the packages' ability to handle business-level tasks, we called for reviewers to retouch a damaged grey-scale photo scanned in by a desktop scanner, to remove a moire pattern from a second-generation halftone using special-effects filters such as Gaussian Blur, and to resample a series of 24-bit colour scanned images down to eight-bit colour, then to remap the images using an optimised 256-colour palette. The second-generation halftone was scanned in at 1250dpi using a desktop scanner; the corrected image was printed on an HP LaserJet III using dot-gain values. The multiple colour resampled and remapped images were used to create a single slide in a 256-colour presentation.

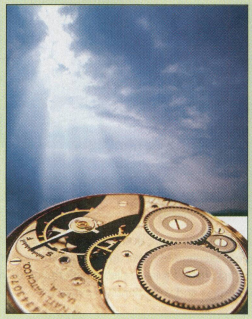
To evaluate professional-level colour production we came up with the conceptual illustration 'Time is Money', an image suitable for use on a billboard or in a print advertisement. All of the pieces of this image, with the exception of the sky, started out as CMYK scans at a 266dpi resolution. If a package could not read the CMYK files, we converted them to RGB. In some cases, we also reduced the image resolution to 75dpi (screen resolution). Following is a step-by-step look at creating that image.

Text image



This is our completed 'Time Is Money' test image, a composite image reviewers created by combining several smaller scanned in photographs. The prototype for this image was created by Marla Milne using Adobe Photoshop

Step one



Reviewers were asked to brighten and lighten the sky in this image to make it more closely resemble a daytime sky and to increase the density of the midtones to enhance the detail. They were asked to apply a persepective effect to the rear plane of the masked watch image to enhance its depth

Step two



Next, reviewers were asked to create a second watch image and darken it without losing the highlights or shadows. They were asked to use a curve set to adjust the quartertone, halftone, and three-quartertone values. This image was later merged with the lighter watch.

Step three



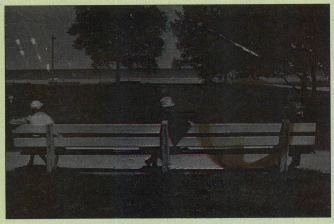
The next step called for reviewers to use Bezier selection tools to create a perfectly smooth selection of the man, skew it to emphasise movement, and then paste it into the already assembled image

Step four

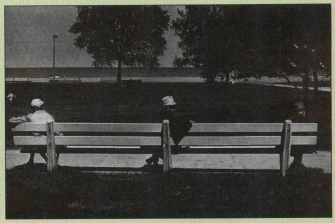


Finally, reviewers had to retouch the plane to correct the angle of the light source. They created a mask of the plane while retouching, lightened the original shadows on the plane, then created new ones on the opposite side.

Before and after



This test image contained a coffee stain as well as several nicks and scratches and a generally muddy appearance. The original black-and-white image was scanned in 24-bit RGB colour format in order to maintain the colour of the coffee stain



We asked reviewers to use the available tools in their respective packages to retouch the scratches and remove the coffee stain on the damaged scan, then to adjust the contrast and brightness to bring out the details of the image

Performance tests: Image-editing software

When it comes to image editing, the more RAM the better. Each package turned in exceptional scores on a test-bed configured with 64M of RAM, in some cases quadrupling its performance on a test-bed configured with 16M of RAM.

How we tested

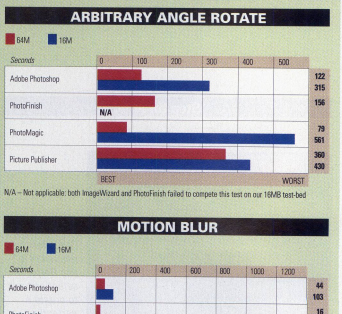
We evaluated these packages on Compaq Deskpro 386/25M EISA systems equipped with 486DX2/66 upgrade cards, 310M 15ms IDE hard disks, and SuperMac Thunder/24 EISA Windows graphics adaptors running at 1280 by 1024 resolution. One set of systems was outfitted with 16M of RAM, and another with 64M of RAM for the professional-level production tasks. All test-beds used SuperMac's SuperMATCH 20-T XL 20in monitors and the Wacom SD-510C, a 6 by 9in tablet, with both its pressure-sensitive stylus and puck. For scanning, we used the Microtek 45t slide scanner and ScanMaker II flatbed colour desktop scanners. We set Windows Swapfile and SmartDrive configurations for each package in accordance with the respective vendor's specifications.

We used Scitex drum scans on 5.25in Syquest cartridges and the PLI (Peripheral Land Inc.) Infinity 88/RW44 SCSI drives, along with PCI's Mac-to-DOS software for file conversions. Each reviewer was required to calibrate their system's video based on match prints ordered with the CMYK scans. To do this, we used the SuperMac hardware-calibration system in conjunction with calibration features offered by each program.

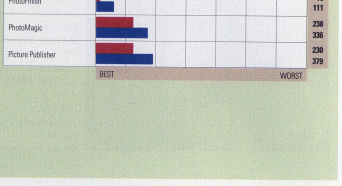
PhotoFinish couldn't complete the Arbitrary Angle Rotate test on our 16M test-bed because of memory constraints, although it did complete it on the 64M test-bed.

The **Arbitrary Angle Rotate** test measures the time it takes to rotate a selected region 153 degrees clockwise.

The **Motion Blur** test measures the speed at which a motion blur of 40 pixels can be applied to a selection.



N/A – Not applicable: both ImageWizard and PhotoFinish failed to compete this test on our 16MB test-bed



to an image; and the Bezier Mask option, with which you can reshape a mask in Bezier-editing mode.

Those familiar with masking from other applications will need to reorient their understanding of the relationship between the mask layer and a pasted object when working with object layers. Selecting Mask Image or Mask Object determines which mask will be active. This was a problem when we tried to fill the text of our test image with a gradient fill. Because the other layers had been combined with the base image, a mask was loaded to protect the Guy.TIF image. When we performed the gradient fill on the text, the mask prohibited the fill from entering areas adjacent to the mask, since all masks reside on a single alpha channel.

With Picture Publisher, a mask can be merged with single or multiple layers. This proved useful in our tests when we blended the light watch with the dark watch using a gradient mask in the base image. While the two object layers were blended, we colour-edited the darker version, enabling us to get an exact visualisation of the colour balance.

Bezier tools, as implemented in Picture Publisher, are line Beziers as opposed to spline or Bezier curves. (Curves can be added to the line segments one step at a time through a point editor, or by using the Freehand mask tool to turn a line into a Bezier curve.) The results for mask creation are the same in terms of quality, but the process is less efficient. This also means that there is no direct support for importing Bezier drawings from other applications. Full implementation is slated for the next release.

Colour limitations

A likely cause for concern for pre-press professionals is Picture Publisher's limited CMYK support. The package lacks the ability to view the primary layers of a colour image without splitting the file, and it doesn't provide support for the Scitex CT image format, which is widely used in professional colour trade shops. Also, the colour calibration system is designed for RGB input and CMYK output, leaving no efficient way to set the screen display to represent the CMYK environment best.

Picture Publisher's colour-correction falls short when measured against the high standard of design and development apparent elsewhere in the application. For example, the package doesn't allow you to read values from the screen when a colour-correction dialogue is opened. During the assembly of our CMYK test image 'Time Is Money', we found this glitch to be a frequent annoyance.

One of Picture Publisher's more impressive features is its 3D colour approach, by which you can edit the secondary components of image pixels as well as their primary components. When we were adjusting the density of the dark watch for the test image assembly, we decided to colour-edit the highlights to reflect the blue of the background sky by using Color Map Curves and selecting blue to edit. By increasing the blue in the highlight range of the colour curve, those pixels with a balance of cyan and magenta were adjusted proportionately.

Strictly for business

Business and casual users will want to investigate PhotoMagic 1.0, which includes about 80 per cent of the capability found in its professional-level sibling at almost a quarter of the price. Like Picture Publisher,

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Summary of features: Image editors

● = Yes ○ = No

	Adobe Photoshop for Windows	PhotoFinish	PhotoMagic for Windows	Picture Publisher
List price	$895	$199	$149	$595
General features				
Minimum memory required	4M	2M	4M	4M
Minimum disk space needed	40M	5M	5.3M	5M
Fixed/variable zoom	●○	●○	●●	●●
Revert to last-saved version	●	●	●	●
Macro recorder	○	○	○	●
OLE support	None	OLE 1.0 (server)	OLE 1.0 (server)	OLE 1.0 (server)
Named clipboards	○	●	●	○
File interchange:				
EPS:				
Interprets and renders EPS files	●	○	○	○
Writes with TIFF preview	●	●	●	●
Writes without TIFF preview	●	●	○	●
IFF (Amiga) (reads/writes)	●●	○○	○○	○○
JPEG (reads/writes)	●●	●●	●●	●●
Kodak Photo CD (read only)	●	●	●	●
Macintosh formats	MacPaint, Pixar, Pixelpaint	Mac TIFF	Mac TIFF	Mac TIFF
PCX (reads/writes)	●●	●●	●●	●●
Scitex CT (reads/writes)	●●	○○	○○	○○
TGA (reads/writes)	●●	●●	●●	●●
32-bit (reads/writes)	●●	●○	●○	●○
TIFF compressed (reads/writes)	●●	●●	●●	●●
Painting tools				
Airbrush	●	●	●	●
User can specify pressure/thickness	●●	●●	○●	●●
User can specify transparency	●	●	●	●
Brush	●	●	●	●
Edit brush shape/save brush	●●	●○	●○	●●
User can specify thickness/transparency	●●	●●	●●	●●
User-defined textures	●	○	○	●
Colour-sensitive paint modes	●	●	●	●
Circles and ellipses	●	●	●	●
Bezier/freehand curves	●●	●●	○●	●●
Spine curves	●	○	○	○
Linear and radial gradient fills	●	●	●	●
Choose angle (linear fills)	●	○	●	●
Choose angle (gradient fills)	●	○	●	●
User can specify more than two colours	○	●	○	○
User can specify line thickness/transparency	●●	●○	●●	●●
Smudge	●	●	●	●
Image processing				
Auto density	●	●	●	●
Colour and grey-scale correction	●	●	●	●
Edits in RGB/CMYK mode	●●	●○	●○	●●
Colour balance	●	●	●	●
Grey balance	●	●	○	●
Select highlight, midtone, and shadow	●	●	●	● (no midtone)
Dither	●	●	●	●
Equalise	●	●	●	●
Histogram	●	●	○	●
Hue/saturation	●●	●●	●●	●●
Negative/posterise	●●	●●	●●	●●
Palette handling:				
Colour models supported:				
CMYK	●	●	○	●
HLS	●	●	●	●
HSV	●	○	○	○
RGB	●	●	●	●

N/A — Not applicable: the product does not have this feature

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Summary of features: Image editors (continued)

	Adobe Photoshop for Windows	PhotoFinish	PhotoMagic for Windows	Picture Publisher
Image processing (continued)				
Colour selector/colour editing	●●	●●	●●	●●
User-defined palettes	●	●	●	●
Resample/resize	●●	●●	●●	●●
Skew/perspective	●●	●○	●○	●●
Tone correction	●	●	●	●
Image-editing tools				
Alpha channels:				
Multiple channels	●	○	○	●
User can define channels	●	○	○	●
User can edit individual channels	●	○	○	●
Bitmap selection tools:				
Circle/ellipse	●●	●●	●●	●●
Edit nodes	●	○	○	●
Expand selection by colour similarity	●	○	○	●
Magic wand (by colour)	●	●	●	●
Move, resize and edit selection	●	●	●	●
Polygon/rectangle	●●	●●	●●	●●
Save selection	●	●	○	●
Select all/invert selection	●●	●○	●●	●●
Clone	●	●	●	●
Filters:				
Add noise	●	●	●	●
Averaging	●	●	●	●
Despeckle	●	●	○	○
Detect/enhance edges	●●	●●	●●	●●
Emboss	●	●	●	●
Guassian blur	●	○	○	●
Motion blur	●	●	●	●
Smooth	●	●	●	●
User-definable filters	●	○	○	○
Image combination:				
Add/subtract	●●	○○	●●	●●
Composite (combine with mask)	●	○	○	●
Anti-alias	●	●	●	●
User can specify opacity	●	●	●	●
Masks:				
Save masks	●	●	N/A	●
Save masks as alpha channels	●	○	N/A	●
Create masks using Bezier/freehand curves	●	○	N/A	●
Create masks using spline curves	●	○	N/A	○
Paste into/outside selection	●●	○○	●●	●●
Split into or combine colour channels	●	○	○	●
Splittable models	☼●●	N/A	N/A	CMYK, HSL, RGB
View individual channels	●	N/A	N/A	●
Image management				
Search for image by name/type	○○	○●	○○	●●
Thumbnail browser	○	●	●	●
Attach labels to thumbnails	N/A	○	●	●
Input device support				
Digitizer tablets	Any Pen Windows device	Any Windows device	Wacom	Wacom
Supports pressure sensitivity	●	○	●	●
Supports scanners through Twain	●	●	●	●
Still video cameras	●	○	●	●
Input device calibration	●	●	●	●
Output device support				
Windows-compatible film recorders/printers	●●	●●	●●	●●
Print options:				
Trim marks/registration marks	●●	○○	○○	●●

N/A — Not applicable: the product does not have this feature

Summary of features: Image editors (continued)

	Adobe Photoshop for Windows	PhotoFinish	PhotoMagic for Windows	Picture Publisher
Output device support (continued)				
Print film negatives/step scale	●●	●●	○○	●●
Specify:				
Emulsion orientation	●	○	○	●
Halftones	●	●	○	●
Dot shape/frequency	●●	○●	○○	●●
Margins	●	○	○	●
Resolution	●	●	●	●
Output device calibration	●	●	●	●
Colour separation	●	○	○	●
Independently specify CMYK channels (refrequency and angles)	●	N/A	N/A	●
Print individual plate/black plate	●●	N/A	N/A	●●
Under colour removal (UCR) and black generation	●	N/A	N/A	●
Dot-gain/ink compensation	●●	●●	○○	●●
Grey-component replacement (GCR)	●	○	○	●
Documentation and support				
Tutorial	●	●	●	●
BBS	CompuServe	Company-run, CompuServe	Company-run, CompuServe	Company-run, CompuServe

N/A — Not applicable: the product does not have this feature

one of PhotoMagic's principal strengths is an informative, easy-to-master interface.

PhotoMagic provides exceptional creative control and functionality for its targeted users. Its thumbnails and ImageBrowser are the best image-management options you're likely to find in any business-level image-editing package. Like its higher-priced sibling, PhotoMagic provides thumbnail previews of filter adjustments in the EffectsBrowser dialogue box and useful colour tools, such as a colour probe and a colour shield.

PhotoMagic features a full array of selection tools as powerful as those found in Picture Publisher. Business users will appreciate the creative control afforded by the ability to set the degree of transparency of a selection or to transform it with ease, and to create selections based upon a user-specified range. About the only thing lacking is the ability to combine masks.

In our tests, we found retouching and enhancing photos simple, thanks to PhotoMagic's powerful selection tools and a wider selection of draw and paint tools than can be found in many professional-level packages. Some of these offerings, such as the natural-media brush styles and colouriser tool, make it easy to go from business user to creative artist with a few mouse clicks.

What keeps PhotoMagic out of the professional realm are its lack of support for importing and editing CMYK images, eight-bit masking, Bezier line-editing controls, expanded control over automatic mask selection, image protection through multiple colour ranges, and the ability to manage larger image files. Business users, however, will not miss these abilities.

With its strong image-management capabilities and tools for creative editing, PhotoMagic is the ideal choice for business-level image editors and those looking for a quick path to creativity. For professionals, Picture Publisher provides all the power needed, if not always in the most efficient manner. But by laying the groundwork for object-oriented development, Micrografx has taken a product, mature in traditional image-editing vocabulary, and pushed it to the limit. Time and another release, however, are needed to smooth out the edges.

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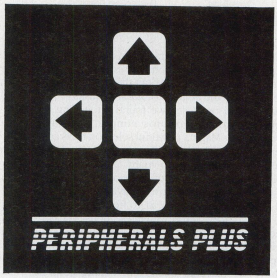
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Let FINDIRQ take the guesswork out of setting the IRQ jumpers when you install a new peripheral into your computer.

BY RICK KNOBLAUGH

Locate available IRQs with FINDIRQ

When you purchase a scanner or other peripheral device, the installation instructions usually tell you to set the jumpers on the board for an 'available IRQ'. Even if you know what an IRQ is, however, chances are you don't know which ones are in use and which are still free. If you install your new device to use an already-assigned IRQ, it may well cause a system crash.

What you need is FINDIRQ, our free utility that tells you which devices in your system are using which IRQs, and which IRQs are unassigned.

An IRQ is simply a hardware interrupt request line that allows a peripheral to signal the computer's central processing unit that an event requiring the CPU's attention has occurred. AT-style machines have 16 IRQ lines; older PCs have but eight. A few IRQ assignments are more or less standard on AT-type machines: the timer uses IRQ0 and the keyboard uses IRQ1, for example. But if you've added optional peripherals, such as a scanner, mouse or fax modem, you need a program like FINDIRQ to learn which IRQs the peripherals have appropriated.

Users of Windows 3.1 and/or DOS 6.0 may wonder whether the new Microsoft Diagnostics (MSD) program makes FINDIRQ unnecessary. MSD does a good job of showing IRQ assignments for standard devices, such as COM and LPT ports. However, MSD will not report the IRQ assigned to any device that is not on its internal list. MSD will tell you the name of the program controlling a given IRQ only if you have not disabled STACKS in your CONFIG.SYS file (more on this later).

Further, since it lacks FINDIRQ's TSR option, MSD overlooks IRQs that are enabled only while a device — such as a sound board — is active. FINDIRQ's TSR option also allows it to detect IRQ usage for devices that are only activated under Windows. If you have a Microsoft InPort mouse, for example, and you use it only under Windows (and no DOS driver for it is installed), most DOS-based diagnostic programs will never detect that the device is present. And while there are a number of commercial IRQ-detecting programs, each with its strengths and limitations, FINDIRQ can hold its own against any of them.

You can get both the executable and source files through the MagDisk service (see details on page 186).

Using FINDIRQ

If you keep FINDIRQ.COM in a subdirectory on your path, simply entering **FINDIRQ** from a DOS prompt will bring up a display similar to that shown in Figure 1. The IRQ usage of all standard devices (those of which the BIOS has knowledge: COM*n* and LPT*n*) will be shown, along with that of any optional devices (like sound boards or SCSI adaptors) that are currently enabled. IRQ assignments for devices controlled by TSR programs will also be displayed if the TSR is loaded in conventional memory.

To report IRQ information for devices controlled by TSRs that are loaded in high memory, FINDIRQ must be invoked with LOADHIGH, thus **LH FINDIRQ.** Note that when FINDIRQ is loaded high, it can still detect TSRs loaded into low memory, so if you use high memory on your system, it's always a good idea to load FINDIRQ high.

In listing the IRQ usage, FINDIRQ assumes certain standard device IRQ assignments. For example, if the BIOS reports that two COM ports are present, it assumes that COM1 uses IRQ4 and COM2 uses IRQ3; these are the standard AT assignments. If your system supports steerable IRQs and you have routed them to nonstandard assignments (a rare situation), FINDIRQ will not properly report the IRQs used by those devices. For standard devices, FINDIRQ displays the device name. For optional character devices, FINDIRQ displays the name of the device as specified by the device driver. For optional block devices, 'Block Device' is displayed. If a device is being handled by a TSR, FINDIRQ displays the name of the TSR program.

FINDIRQ syntax options

To document even unusual and elusive interrupts, FINDIRQ provides a variety of optional parameters. In summary form, the syntax for the command is

```
[LH] FINDIRQ [/t] [/i] [/u] [/d]
    [/h]
```

As indicated initially, some interrupts are enabled only when the devices that use them are active. To detect such devices — sound boards, for instance — FINDIRQ must be memory-resident at the time the devices are activated. FINDIRQ can be installed as a TSR, therefore, by entering **FINDIRQ /t.**

When the TSR component of FINDIRQ is loaded, your system is constantly being monitored in the background for IRQ activity. When a previously unassigned IRQ is enabled, its IRQ information is stored in a tiny, 2-byte data file, FINDIRQ.DAT, which FINDIRQ creates in its subdirectory. FINDIRQ uses the information in this file to supplement what it knows about IRQ usage. This scheme can't tell you whether a tem-

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porarily activated IRQ is currently in use, but it can tell you that the IRQ has been used at some point and is probably not available for other devices.

If you change your system configuration — by removing or rejumpering a board, for example — you must reinitialise the FINDIRQ.DAT file. This is done by executing the /i option **FINDIRQ /i.** Regardless of whether the TSR component is resident, you display IRQ usage in the same way — by typing FINDIRQ with no switches. If the resident portion is currently loaded, a notation will appear on the left side of the display. Although the resident portion of FINDIRQ is very small (less than 3K), you can unload it if you wish by typing **FINDIRQ /u**.

In certain cases, programs can erroneously enable IRQs; that is, the IRQs can appear to be in use when in fact they are not. To guard against false reporting, FINDIRQ normally verifies that enabled IRQs have valid handlers before reporting that they are unavailable. This is done by checking that the handler is not simply a ROM default interrupt handler, which has as its job the fielding of spuriously generated interrupts.

When an IRQ is enabled under Windows and no DOS device driver for the device is installed, however, the handler cannot be verified. There are also other instances in which interrupt handlers cannot be verified, such as when IRQ enabling is intermittent or when a memory manager has remapped ROM. In these circumstances, FINDIRQ will incorrectly report that the IRQ is available. To suppress FINDIRQ's verification requirement and so avoid this problem, you can execute FINDIRQ with its 'don't verify' switch: **FINDIRQ /d.** Finally, to remind yourself of the range of FINDIRQ options, simply execute the program with its help switch: **FINDIRQ /h.** The help screen lists and describes all program options.

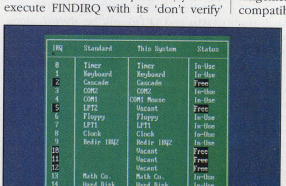


Figure 1: FINDIRQ indicates which of your system's IRQs are being used and which are unassigned

IRQ review

Before delving into FINDIRQ's inner workings, a brief review of interrupt processing may be helpful. Interrupts provide a time-saving alternative to periodically polling all the peripherals attached to the system to determine whether they require the CPU's attention. Under an interrupt system, peripheral devices receive recognition only when they ask for it. Thus, the system processor does not waste processing time repeatedly checking for characters being typed at the keyboard or data bytes being received by an attached modem.

Devices such as the keyboard controller and the communications UART chip utilise the interrupt lines labeled IRQ0 through IRQ15. These lines go to the 8259 Programmable Interrupt Controllers (PICs), which arbitrate the interrupt requests and then activate the processor's single interrupt request line. A detailed discussion of this process can be found in *The IBM PC from the Inside Out*, by Sargent and Shoemaker (Addison-Wesley, $50.95).

Figure 2 depicts this arrangement and shows the standard IRQ assignments used by an AT-class machine. Each 8259 PIC handles eight interrupt lines; to accommodate additional interrupt lines, multiple 8259s are tied together. One serves as the master and has a cascade line that connects it to slave 8259s. On the AT, IRQ2 is used for this purpose. Note, however, that you can still attach devices that utilise IRQ2. The adaptor-card edge connector used for IRQ2 in PC-class machines is wired to IRQ9 in AT machines. It is then routed via a software interrupt to the interrupt for IRQ2. This round-about arrangement was implemented to provide compatibility with original PC adaptor boards.

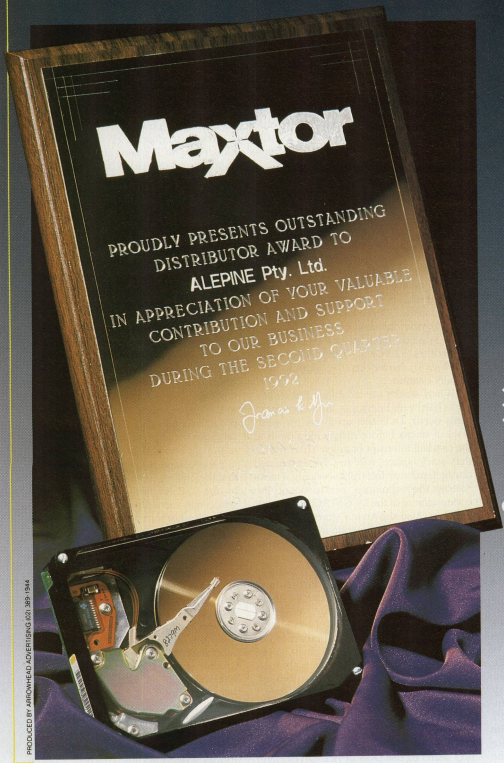
When each 8259 is initialised, the interrupt base value is written to the PIC. This value determines which interrupt number is generated. The master PIC starts at 8, so IRQs 0 through 7 generate interrupts 8 through 15. The slave PIC starts at 70h, so IRQs 8 thru 15 generate interrupts 70h through 77h. The PIC registers are accessible in I/O space; the master PIC is based at 20h and the slave starts at A0h.

FINDIRQ checks the PIC's Interrupt Mask Register to detect active interrupts. In this 8-bit register, each bit position corresponds to one of the interrupt

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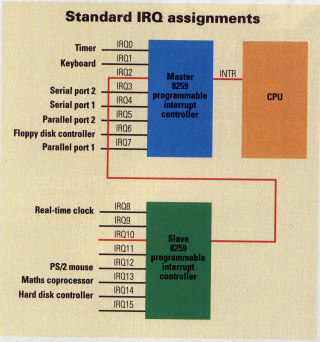


Figure 2: Shown here are the master and slave 8259 interrupt controllers and the standard IRQ assignments utilised in AT-class platforms

lines. The BIOS and other device handlers use this register to enable or disable the generation of interrupts. Interrupts are disabled or 'masked' when a 1 is written to the corresponding bit position, while a 0 means that they are enabled.

How FINDIRQ works

FINDIRQ starts by checking the system model ID byte at 0F000:FFFE to ascertain whether the system is an AT-class machine (16 IRQ lines) or an older, PC-type machine (8 IRQ lines). The program next attempts to read FINDIRQ.DAT, which exists if FINDIRQ has previously been executed as a TSR. The file FINDIRQ.DAT contains two bytes (16 bits) that show the IRQs that have, at some point, been enabled.

After checking the data file, the PIC mask registers are read to determine which IRQs are currently enabled. FINDIRQ maintains its own copies of the PIC mask registers and sets the bits appropriately as it learns about the devices present on the system.

IRQs assigned to COM and LPT devices may not be enabled if the devices are not being used. The INT 11h equipment check call is used to determine the number of COM and LPT ports available, and the IRQs corresponding to these are recorded in the FINDIRQ PIC mask variables. If a mouse is present and its driver is loaded, determining its IRQ is easy: software interrupt 33h, function 24h returns information about the type of mouse and its IRQ assignment. For PS/2 mice, the IRQ is not returned, but the IRQ assignment is always IRQ12.

If an IRQ is enabled and has a standard system assignment, FINDIRQ can easily display the description for the device. For example, if IRQ6 is enabled, the utility knows that the device description is 'Floppy'. For optional devices, FINDIRQ displays the name of the device as it is specified by the device driver (for character devices) or the name of the controlling program (in the case of a TSR). In order to do this, FINDIRQ must locate these items in memory.

Finding the driver or TSR

The first step in finding a device driver or TSR program is to look at the interrupt vector corresponding to the IRQ. For device drivers, if stacks have been disabled (that is, if **`STACKS 0,0`** has been entered in the CONFIG.SYS file), the vector will provide the address directly. Since most systems have stacks enabled (the default is STACKS 9128 on AT-class machines), however, the search must usually continue.

When stacks are enabled, DOS intercepts hardware interrupts, and when interrupts occur, DOS sets up a stack from its pool of stacks before dispatching them to the original interrupt handler. This ensures that stack space will not be exhausted during hardware interrupt servicing. Figure 3 shows the techniques used to identify the code segment of the DOS STACKS interrupt handlers. Also shown in Figure 3 is the way FINDIRQ inspects the code in those handlers as it looks for the original interrupt service routine (ISR) address.

For later versions of DOS, FINDIRQ takes advantage of the memory control block's subsegment control blocks (these only exist in DOS 4.0 and later). FINDIRQ uses the undocumented 'list of lists', DOS function 52h, to establish a pointer to the memory control block (MCB) chain. Using the subsegment control blocks within the MCBs, the STACKS entry can be located, yielding the segment of the STACKS area.

Finding the name

Once the ISR address is determined, FINDIRQ searches the DOS device driver chain for an entry that has a code segment which matches that of the interrupt handler. Again, the 'list of lists' DOS function is utilised, this time to retrieve the pointer to the DOS driver chain. Andrew Schulman's text, *Undocumented DOS* (Addison Wesley, $58.95), contains an excellent discussion of the requisite techniques. If a match is found in the driver chain and if the driver is a character device driver, FINDIRQ copies the name of the device contained in the device driver header into its description area. For block devices, which are referenced by drive letters instead of device names, 'Block Device' is used as the description. If the ISR address does not belong to a device driver, it presumably belongs to a TSR. Thus the next step is to search the MCB chain for entries that point to executable code.

The procedures used for searching the driver and MCB chains are listed in Figure 4. All programs loaded by DOS begin with a program segment prefix (PSP), the information that includes a pointer to the program's copy of the environment. The job at hand is to locate the PSP for the TSR.

The 16-byte MCB immediately precedes the block of memory it describes. Within each MCB is one field that contains the PSP segment of the program that owns the memory block and another field that tells how large the block is. If the block of memory described by the MCB is also the owner, then the block contains a program; it's not an environment block or another allocated chunk of memory. If the ISR address falls in the block of memory (as defined by its size), then the TSR is found. Once the TSR is located, the PSP's pointer to the environment is used to retrieve the program name. With DOS 3.0 and later, the program name is stored in the last portion of the environment block.

One complication that can arise here is that the environment may have been freed by the TSR. In such a case, the address space may actually contain the environment for another program. To ensure that it has the right environment, FINDIRQ compares the owner field of the MCB for the environment with the PSP segment. If these are different, the environment has been freed. Even in such a case, however, the program name can sometimes still be retrieved; DOS versions 4.0 and later place the program name in the MCB itself. If all else fails, FINDIRQ uses 'Other' for the description of the program that handles the interrupt. IRQ usage that can only be detected with FINDIRQ's TSR component will usually list 'Other' as its description.

TSR approach

When FINDIRQ is invoked with the TSR option, it becomes resident in the system

STACKS routines

```
;-------------------------------------------------------------------
;get_stacks_seg - Determine the segment where the DOS STACKS       |
;                 code resides.  This will be used later          |
;                 for tracing back through the STACKS             |
;                 interrupt handlers to find the original         |
;                 ISRs.                                           |
;                                                                 |
;           Enter:                                                |
;                  ds = local data segment                        |
;                  stclassf = TRUE if AT class machine            |
;                  dos_ver = DOS minor ver/major ver              |
;                                                                 |
;           Exit:                                                 |
;                                                                 |
;       dos_handler_seg = segment for DOS STACKS.                 |
;                                                                 |
;  ds preserved.                                                  |
;-------------------------------------------------------------------
get_stacks_seg  proc    near
                push    ds
                xor     bx, bx
                mov     ds, bx                  ;vectors
                assume  ds:nothing

;Use the segment found in the floppy handler as our default guess of
;where the STACKS code is.
;
;
                mov     bx, (fpcflop * BEQ_INTS) shl 2) ;vector for IRQ6
                mov     ax, [bx].d_segment

                cmp     byte ptr cs:dos_ver, 4  ;DOS 4 or better?
                jb      get_stacks888

;If DOS 4 or better, memory control block, subsegment control blocks
;can be used to find STACKS.
;
                mov     ah, DOS_LIST_LISTS
                int     21h
                mov     dx, es:[bx - 2]         ;segment of first MCB
                mov     ds, dx
                mov     cx, dx                  ;save it
                xor     bx, bx
                cmp     [bx].mcb_sig, 'M'       ;valid MCB?
                jne     get_stacks888           ;MCBs corrupted

                mov     di, [bx].mcb_size       ;get first size
                inc     di                      ;add para for the MCB
                add     dx, di                  ;after DOS data seg

                inc     cx                      ;1st subsegment block
get_stacks100:
                cmp     cx, dx                  ;at end of info?
                jae     get_stacks888           ;if so, search done
                mov     ds, cx                  ;load the segment
                cmp     [bx].mcb_sig, 'S'       ;STACKS?
                je      get_stacks998
                mov     cx, [bx].mcb_owner
                add     cx, [bx].mcb_size       ;advance to next block
                jmp     short get_stacks100

get_stacks888:
                mov     ax, [bx].mcb_owner
get_stacks898:
                mov     cs:dos_handler_seg, ax  ;save it
get_stacks900:
                pop     ds
                assume  ds:code
                ret
get_stacks_seg  endp

;-------------------------------------------------------------------
;ck_for_dos - Given a ptr to an interrupt vector, determine if|
;             the handler is one of those inserted by DOS     |
;             to first check stack before dispatching to      |
;             original ISR.  If it is, attempt to get the     |
;             address of the original ISR.                    |
;                                                             |
;           Enter:                                            |
;                  ds = local data segment                    |
;                  es:bx = ptr to vector                      |
;         dos_handler_seg = segment of the DOS handlers       |
;                                                             |
;            Exit:                                            |
;                                                             |
;              Carry set if no DOS handler present or         |
;                   can't find original ISR.                  |
;                                                             |
;           else  es:bx = ptr to original ISR                 |
;                                                             |
;  All other registers preserved.                             |
;-------------------------------------------------------------|
ck_for_dos      proc    near
                push    ax
                push    cx
                push    di

                mov     ax, dos_handler_seg
                cmp     es:[bx].d_segment, ax   ;same seg STACKS?
                jne     ck_for_988
                les     di, es:[bx]             ;es:di = &handler
                mov     al, es:[di]             ;get byte of code

;Several different flavors of these stack handlers are used in the
;various iterations of DOS.  Look for the following cases:
;
;case 1:        jmp  label
;               dd   &old_isr
;
;          label: call handler   ;put offset of &ISR on stack
;                 dw  offset var ;and go get it and call it
;
;case 2:        call handler   ;put offset of &ISR on stack
;               dd   &old_isr
;
;case 3:        jmp  label
;               dd   &old_isr
;
;         label: ...
;
;                pushf
;                cs:
;                call far [xxxx] ;also this it may not follow the
;                                ;jmp
;
;case 4:        push ax
;               ...
;               ...
;
;               pushf
;               cs:
;               call far [xxxx]  ;xxxx is the offset of the
;                                ;variable that holds the &ISR
                cmp     al, OP_JMP      ;is it a jmp
                jne     ck_for_200
                inc     di
                inc     di
                sub     ah, ah
                mov     al, es:[di]     ;get next type of code
                inc     di              ;past 2nd byte of rel jmp
                add     di, ax          ;get to location of jmp

                mov     al, es:[di]     ;get byte of code there
ck_for_200:
                cmp     al, OP_CALL     ;is it a call
                jne     ck_for_300
                mov     di, es:[di + 3] ;offset to dd that holds &ISR
                les     bx, es:[di]     ;&ISR
                jmp     short ck_for_999 ;exit with carry clear

ck_for_300:
                mov     cx, BYTES_TO_SEARCH
ck_for_400:
                mov     al, OP_PUSHF
                repne   scasb           ;pushf instruction?
                jcxz    ck_for_900
                mov     al, OP_CS       ;CS override?
                scasb
                jnz     ck_for_400
                mov     ax, OP_CALL_MEM16
                scasw                   ;call?
                jnz     ck_for_400
                mov     di, es:[di]     ;offset of var that holds &ISR
                les     bx, es:[di]     ;get &ISR

ck_for_888:
                jmp     short ck_for_999 ;exit with carry clear
ck_for_900:
                stc
ck_for_999:
                pop     di
                pop     cx
                pop     ax
                ret
ck_for_dos      endp
```

Figure 3: These routines identify the segment where the DOS STACKS interrupt handlers reside and retrieve the original interrupt service routine address

Search procedures


```
;-------------------------------------------------------------
;find_drivers - For all IRQs that are active, look to see if
;               we have a description for the device.  If we
;               don't, the device using this IRQ must be
;               something we don't know about, such as a
;               sound board, SCSI adapter, etc.  In this case,
;               go get the driver name or program name and
;               put it in the description for the IRQ.
;
;               In the event that a driver or TSR (with
;               PSP) is not found, assign "Other" for the
;               device description.
;
;
;         Enter:
;                 ds=local data segment
;                 atclassf = TRUE if AT class machine
;
;                 pic_mask = PIC mask values.
;
;         device_desc = offset to array of description
;                       offsets.
;
;          Exit:
;
;  ds, bp preserved, es trashed.
;-------------------------------------------------------------
find_drivers    proc    near
                push    bp
                mov     ah, DOS_LIST_LISTS
                int     21h                     ;get es:bx ptr to lists

                cmp     dos_ver, 0003h  ;DOS 3.0?
                jne     find_drv_050
                lea     bx, es:[bx].mul_dev_head30 ;ptr to NUL device
                jmp     short find_drv_080
find_drv_050:
                lea     bx, es:[bx].mul_dev_head   ;ptr to NUL device
find_drv_080:
                mov     ax, es
                mov     drv_ptr.d_segment, ax   ;save ptr to start
                mov     drv_ptr.d_offset, bx    ;of driver chain

                xor     al, al                  ;IRQ counter
                mov     bp, pic_mask
                mov     cx, 16                  ;16 IRQs on AT
                cmp     atclassf, TRUE          ;AT machine?
                je      find_drv_100
                mov     cx, 1                   ;only 8 IRQs on PC
find_drv_100:
                shr     bp, 1                   ;check IRQ
                jc      find_drv_680            ;skip if not active
find_drv_110:
                call    get_desc_entry          ;description for IRQ
                xor     bx, bx                  ;is there one?
                je      find_drv_125
;
;If there is already a description for the device, don't need to look
;for driver.  However, there is one exception.  If we are on an AT,
;we always assign an initial description of "cascade" to IRQ2.  If
;that is the only description we have (e.g. we haven't got a mouse on
;IRQ2, etc.), go ahead and look for a driver using IRQ2.
;
                cmp     atclassf, TRUE          ;AT machine?
                jne     find_drv_680            ;if not, no cascade
                cmp     al, 2                   ;doing IRQ2?
                jne     find_drv_680            ;if not, no test
                cmp     [di + 2], bx            ;check 2nd desc (bx=0)
                jne     find_drv_680
                add     di, 2                   ;next desc entry

find_drv_125:
                mov     es, bx                  ;point to vector

                mov     bl, al                  ;irq number
                cmp     al, 8
                jb      find_drv_150
                add     bl, (BEG_SLAVE_INTS  - 8)
                jmp     short find_drv_175

find_drv_150:
                add     bl, BEG_INTS
find_drv_175:
                shl     bx, 1
                shl     bx, 1                   ;offset into vectors
;See if pointing to DOS stack handlers.  If so, carry is not set and
;es:bx points to address of original ISR.
;
                call    ck_for_dos
                jnc     find_drv_200            ;es:bx point to ISR

                les     bx, es:[bx]             ;point to ISR
find_drv_200:
                call    load_drv_desc
find_drv_680:
                inc     al                      ;advance IRQ counter
                loop    find_drv_100
find_drv_980:
                pop     bp
                ret
find_drivers    endp

;-------------------------------------------------------------
;load_drv_desc - Retrieve and load driver description.
;
;         Enter:
;                 ds=local data segment
;                 di=offset of entry for description
;                 es:bx=ptr to ISR for which description is
;                       needed.
;         device_desc = offset of description
;                       offsets.
;         drv_desc_ptr = offset of next work description area.
;
;          Exit:
;                 [di]=offset of description.
;             drv_desc_ptr advanced to next work description area.
;
;  all registers saved.
;-------------------------------------------------------------
load_drv_desc   proc    near
                push    ax                      ;save picmask/IRQ counter
                push    cx                      ;save loop count
                push    di                      ;save offset of desc entry

                push    bx                      ;save offset
                mov     dx, es                  ;address in dx:bx
                call    is_it_driver            ;see if driver or TSR
                pop     dx                      ;get back offset (bx)
                jnc     load_drv_300            ;jmp if not a driver
                mov     dx, offset block_desc   ;"Block Device"
                cmp     al, 2                   ;IRQ2? if so, may have
                jne     load_drv_290            ;"Cascade" if AT - use
                mov     dx, offset block_abbrv  ;abbrev desc to fit
load_drv_290:
                test    es:[bx].dev_attrib, 8000h ;char driver?
                jz      load_drv_550    ;if not, use "Block Device"
                call    mov_char_name   ;if so, move char device name
                jmp     short load_drv_450
load_drv_300:
;Wasn't a driver.  Must be a TSR.  Using the pointer to environment
;from the TSR's PSP, find the name of executable.
;
;
                mov     bx, dx                  ;offset of ISR
                call    determine_psp           ;return nc if PSP found
;
;If a PSP is found, carry will NOT be set.  Also, if PSP is found, and
;ax is nonzero, ax holds the segment of the environment.  If ax is
;zero then the environment was freed.  If such cases, es:bx will be
;returned as a pointer to the filename description in the MCB
; (if DOS is 4.x or better - otherwise bx=0)
;
                jnc     load_drv_350
load_drv_330:
                mov     dx, offset other_desc   ;can't get filename
                jmp     short load_drv_550      ;so, go assign "Other"
load_drv_350:
                or      ax, ax                  ;environment found?
                jnz     load_drv_370            ;if so, get filename
                or      bx, bx                  ;name in MCB?
                jz      load_drv_330            ;if not, print "Other"
                jmp     short load_drv_400      ;go get name
load_drv_370:
                mov     es, ax
                call    retrieve_path           ;get ptr to filename
                jc      load_drv_330            ;if data not right
load_drv_400:
                mov     di, drv_desc_ptr
                mov     dx, di                  ;save desc ofset
                call    mov_file_name
load_drv_450:
                mov     al, STR_TERM
                stosb                           ;terminate it
                add     drv_desc_ptr, size drv_descrip
load_drv_550:
                pop     di
                pop     cx
                pop     ax
```

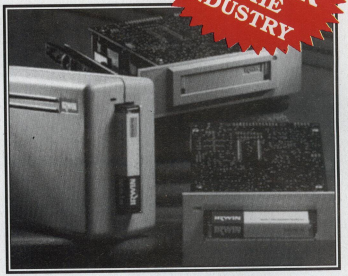
Figure 4: The procedures listed above are used to search the driver and MCB chains

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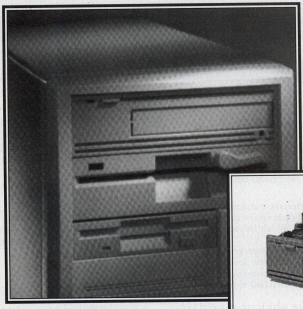
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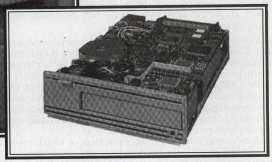
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Search procedures

2 of 2

```
                mov     [di], dx                ;store offset of name
                ret
load_drv_desc   endp

;-------------------------------------------------------------------------
;determine_psp - An ISR was found and it is not part of a
;               device driver.  Search the MCB chain for
;               PSP associated with code that would contain
;               the ISR.  If found, check the environment
;               entry for the PSP.  If environment has not
;               been freed, return ax=environment segment. If
;               not found and DOS is 4.x or better, return
;               es:bx as ptr to filename in MCB.
;
;
;       Enter:
;                       es:bx = ptr to ISR
;
;       Exit:
;                       cy set if PSP NOT found else nc
;                       also if found ax=environment seg (zero
;                                       if it was freed)
;
;                       if found and ax=0, es:bx=ptr
;                                       to filename in MCB
;                                       (zero if < DOS 4)
;
;  ds preserved.
;-------------------------------------------------------------------------
determine_psp   proc    near
                push    ds
                mov     dx, es                  ;segment of ISR
                mov     cl, 4
                shr     bx, cl                  ;convert to paragraphs
                add     dx, bx                  ;para location of code

                mov     ah, DOS_LIST_LISTS
                int     21h
                mov     di, es:[bx - 2]         ;segment of first MCB
                mov     es, di
                xor     bx, bx                  ;offset zero in MCB
                mov     si, es                  ;save MCB segment
determine_p288:
                inc     si                      ;ready for next one

                cmp     es:[bx].mcb_sig, 'Z'    ;at end of chain?
                je      determine_p900          ;if so, not found
                cmp     es:[bx].mcb_sig, 'M'    ;valid entry?
                jne     determine_p988          ;if not, MCBs wrong

determine_p1b0:
                mov     cx, es:[bx].mcb_owner   ;get MCB owner seg
                mov     di, cx                  ;save it

                mov     ax, es:[bx].mcb_size    ;and its size
                cmp     cx, si                  ;is this a PSP?
                jne     determine_p7d0          ;if not, go next PSP

                cmp     dx, cx                  ;compare segment
                jb      determine_p7d0          ;beneath the segment
                add     cx, ax                  ;get end of the area
                cmp     dx, cx
                ja      determine_p7d0          ;above the segment

                assume  ds:nothing
                mov     ds, di                  ;ds=seg of owner
                mov     ax, [bx].psp_environ_seg

                or      ax, ax                  ;freed environment?
                jz      determine_p488          ;if so, try plan b

                dec     ax                      ;1 paragraph back
                mov     ds, ax                  ;is seg of MCB for it
                inc     ax                      ;back to "environment"
                cmp     [bx].mcb_owner, di      ;belongs to PSP?
                je      determine_p959          ;yes, exit nc, ax=seg
determine_p488:
                xor     ax, ax                  ;indicate none
                cmp     byte ptr cs:dos_ver, 4  ;DOS 4 or better?
;
;if yes, we can return filename
;if not, bx=0 indicating must print "Other"
;
                cmc                             ;carry clear if < DOS 4
                jnb     determine_p959          ;nc and bx=0 if < DOS 4
determine_p58d:
                clc
                lea     bx, es:[bx].mcb_fname
                jmp     short determine_p959    ;nc, es:bx = &filename
determine_p7d8:
                add     si, ax                  ;get to next MCB
                mov     es, si
                jmp     short determine_p1b0
determine_p98b:
                stc
determine_p959:
                assume  ds:code
                pop     ds
                ret
determine_psp   endp
```

QUICK REFERENCE GUIDE

FINDIRQ command

Rick Knoblaugh

Purpose: Reports which interrupt request lines (IRQs) in a system are assigned to specific devices and which are free to use for installing a new peripheral device.

Format: [LH] FINDIRQ [/i] [/l] [/u] [/d] [/h]

Remarks: Executed from a DOS prompt and without any of its optional parameters, FINDIRQ identifies installed standard (AT) IRQ devices and optional character devices by device name. Optional block devices are designated by 'Block Device'. TSR-controlled devices are identified by their program names.

The command FINDIRQ will detect devices controlled by TSR programs that are loaded in conventional memory. Devices controlled by TSRs loaded in high memory require entering the command as **LH FINDIRQ.** Since this latter command form also detects conventionally sited TSRs, **LH FINDIRQ** should be used on systems that use high memory.

Peripherals such as sound boards, the IRQ numbers of which are enabled only when the devices are active, can be detected only by activating them while FINDIRQ is memory-resident. The command **FINDIRQ /t** installs the utility as a TSR; **FINDIRQ /u** uninstalls it. While memory-resident, FINDIRQ records IRQs in the file **FINDIRQ.DAT,** which is read before displaying its onscreen report. Since any configuration changes render the previous contents of FINDIRQ.DAT obsolete, the data file can be reinitialised by entering **FINDIRQ /i.**

FINDIRQ verifies its interrupt information before presenting it. In some circumstances, however, such as when an IRQ is enabled under Windows but no DOS interrupt handler is located, no verification is possible, so the interrupt will appear to be free when it is not. To check for such a possibility, the verification requirement can be turned off with the command **FINDIRQ /d.** Finally, a help screen can be displayed by entering **FINDIRQ /h.** Both the executable FINDIRQ.COM and its assembly language source files can be ordered through MagDisk.

and monitors the enabling of IRQs in the 8259 PIC interrupt mask registers. The TSR component of FINDIRQ chains into the user timer interrupt (INT 1Ch), and the PIC mask registers are read approximately once a second. When a new IRQ is enabled, FINDIRQ sets a flag so that it can update its .DAT file when it is safe to do so. Interrupt 28h, the DOS idle handler, provides the means of detecting the period in which it is safe to use DOS functions from within a TSR. As mentioned earlier, this data file is read by FINDIRQ when it is invoked to display IRQ status information.

Summary

Adding new devices to your system can be a challenge. The difficulties are sufficient to have prompted Microsoft to spearhead development of the Plug and Play Industry Standard Architecture Specification, which may someday make manual configuration obsolete. In fact, IBM's MCA architecture already supports 'plug and play', though it is not in wide use. But until automatic configuration becomes a standard, the next time you need to add a peripheral that uses an IRQ, fire up FINDIRQ and make your IRQ selection with ease.

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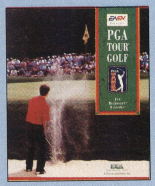
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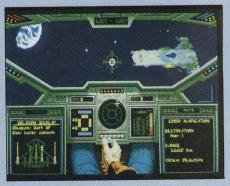


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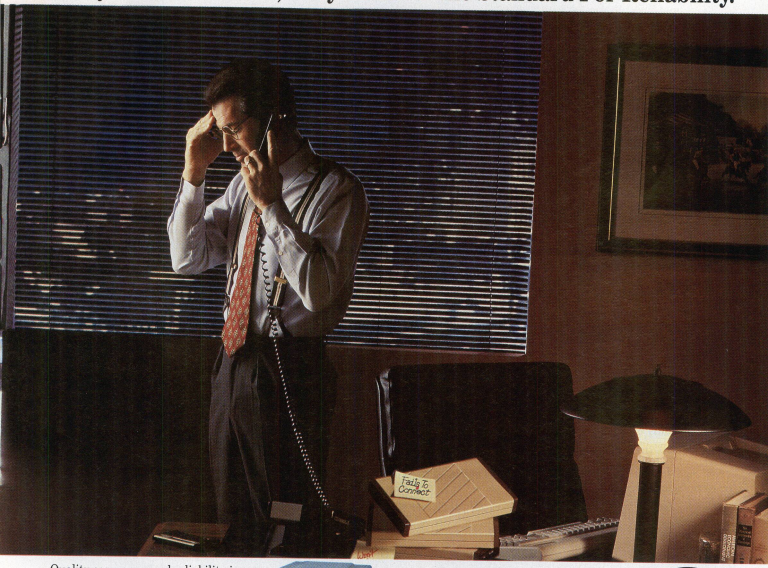
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Sound:	Major cards
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Operating environments

Using the SUBST command

I'm running DOS 5.0 and having trouble getting the SUBST command to work. Though I've included the line LASTDRIVE=Z: in my CONFIG.SYS file, if I give the command SUBST M: C:\, I get the message "Path not found — C:\". What's wrong, and how can I fix it?
Richard E. Mild

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I suspect that the example you cite is not the actual command you tried to use. The SUBST command turns out to be quite finicky about how you use trailing backslashes when you name a directory. For example, SUBST M: C: will produce an error message: 'Invalid parameter—C:.' But SUBST M: C:\ will work just fine.

If you try SUBST M: C:\TEMP\, however, you get 'Path not found—C:\TEMP\'—even if there is a TEMP directory off your disk's root directory. You have to state it as SUBST M: C:\TEMP in order to get the command to work. The trick is to use a trailing backslash only if you are referring to the root directory; otherwise, leave it off.

You may have heard warnings against using the SUBST command if you're running Windows, but as long as you're careful to establish the substitution before you start Windows, you shouldn't have any problems. You should never add or change a SUBST assignment during a Windows session, however.

I've included a SUBST statement in my AUTOEXEC.BAT that substitutes a drive letter for a directory that is three levels down from the root directory, which in turn has a dozen or so subdirectories below it. This use of the SUBST command saves a lot of typing and scrolling through directory boxes, and I've never had a problem with this configuration under Windows 3.0 or 3.1.

Beginning with DOS 4.0, there's a hidden goodie you should know about if you use SUBST: the TRUENAME command, which tells you what the 'real' path is for a substituted drive. For example, in order to see the path for drive M:, all you have to do is give the command TRUENAME M: and DOS will display the full path. (If you are currently in a subdirectory of drive M:, such as M:\TEMP, the subdirectory will be included as part of the path.) This undocumented DOS command is a real boon to users who take advantage of the SUBST command.
Alfred Poor

CD-ROMs for OS/2

I have an 80486 PC running OS/2 2.0. Can you tell me what I have to do to add a CD-ROM drive? OS/2 shipped with a standard CD-ROM driver (CDROM.SYS). Will this driver support any CD-ROM I can buy, such as those from NEC, Talon and Texel? And what about SCSI or proprietary adaptors from drive manufacturers?
P. Barthe

Australian Personal Computer RESPONSE

The CDROM.SYS driver that shipped with the original release of OS/2 2.0 supported only IBM and Toshiba CD-ROM drives and a limited number of SCSI cards. IBM later released a generic SCSI CD-ROM driver that was supposed to work with CD-ROMs from other vendors, but most users quickly discovered that getting their CD-ROM to work with this driver was a hit-or-miss proposition. OS/2 2.1 has changed all that. IBM responded to customer complaints about OS/2's limited CD-ROM support by adding direct support for more than 31 different CD-ROMs, including various models from Hitachi, NEC, Panasonic, Pioneer, Sony, Texel and Toshiba. Support for various SCSI cards from Adaptec, DPT, Future Domain and IBM has also been added. An upgrade from Version 2.0 costs $119.
Joe Salemi

Word processing

Slim down WinWord files containing graphics

I recently had a chance to use Microsoft Word for Windows 2.0 for the first time and liked it enough that I almost decided to use it for my next book. After working with it for several days, however, I realised that if you add graphics to a file, the program eats up a surprising amount of disk space.

For example, I started by importing a 32,768-byte ASCII text file into WinWord, and then embedded two PCX graphics files, each of which was roughly 12,500 bytes. The resulting file, saved as a WinWord document file, was nearly 93,000 bytes. Following the same procedure with Windows 3.1 Write yielded a file that was only about 51,000 bytes. Given this difference, WinWord would seem to be a poor choice if you need to include graphics in your documents. Is there any way to minimise the WinWord document file size?

Sumpun Wongnawa

Australian Personal Computer RESPONSE

The amount of disk space WinWord uses for graphics varies greatly depending on how you insert the graphics into your document. (I'm using *insert* in its generic sense here and am not referring only to the choices on the WinWord Insert menu). To prove the point, I started with a 32,496-byte PCX file, inserted it into an otherwise empty WinWord document using two different techniques, and then modified it in various ways.

For each technique, and each modification, I created and saved a new file. As a point of reference, I also inserted the graphic into Write by copying it from Paintbrush to the Clipboard and pasting it into Write. Figure 1 shows the results of these tests.

The largest file by far was 927,230 bytes, created by loading the graphic in Paintbrush, copying it to the Clipboard, and then pasting it into WinWord. The result is automatically entered as an EMBED field, with Paintbrush as the server application — meaning that if you chose to edit the image (by double-clicking on it or choosing Edit | Paintbrush Picture Object), Windows would load Paintbrush to let you modify the file. The graphic image is the result returned by the EMBED field code.

File sizes when a graphic is inserted

Image-insertion method	Resulting field	Size (bytes)
Original PCX file	None	32,496
Write file, inserted with Copy from Paintbrush, Paste into Write	None	308,352
WinWord file, instead with Copy from Paintbrush, Paste into WinWord . . .	EMBED (Paintbrush)	927,230
. . . then Ctrl-Shift-F9 to break link . . .	None	311,276
. . . then edit as MS-Draw object	EMBED (MS-Draw)	930,401
Insert picture . . .	None	156,728
. . . then edit as MS-Draw object . . .	EMBED (MS-Draw)	466,017
. . . then Ctrl-Shift-F9 to break link	None	157,263

Figure 1: As these examples show, the file size of a WinWord document that includes grahics can very tremendously, depending on how the graphics are inserted. In general, graphics inserted as actual images yield smaller files than graphics inserted as field code results

At 927,230 bytes, the WinWord file is three times the size of the Write file created the same way. But if you select the object in WinWord, and then type Ctrl-Shift-F9 to break the link, WinWord will replace the EMBED field with the picture itself — no longer a field code — and the file size will drop down to 311,276 bytes, or about the same size as the file in Write. If you then edit the graphic in Microsoft Draw by double-clicking on it or selecting it and choosing Edit | Picture, WinWord will replace the image with another EMBED field, this time using MS-Draw as the server application. The resulting file size will balloon back up to 930,401 bytes.

The smallest WinWord file size I arrived at was 156,728 bytes, created by inserting the graphic with the Insert | Picture command. By default, Insert | Picture inserts the picture itself rather than a field code. But if you edit the image with MS-Draw, thereby converting the graphic to an EMBED field, the file size jumps to 466,017 bytes. Break the link and it falls back to roughly the original size.

In both of these test runs, regardless of how I originally inserted the graphic, the version with the graphic image itself was about one third the size of the version with the EMBED field. According to Microsoft, similar ratios generally hold true for most graphic formats. The difference in file size between the two techniques is based on how you insert the image into the document.

If you want to minimise file size, then, you'll want to use Insert | Picture rather than pasting from the Clipboard. And you'll want to avoid using EMBED fields, converting the file. The graphic image is the result returned by the EMBED field code.

File sizes when using LoadSavePictures

Image-insertion method	Resulting field	Size (bytes)
Insert Picture with Link . . .	Import	156,389
. . . then compress with LoadSavePictures and save . . .	Import	2271
. . . then restore with LoadSavePictures and save . . .	Import	156,389
. . . then edit as MS-Draw object and save	EMBED (MS-Draw)	465,656

Figure 2: The LoadSavePictures macro will let you cut down tremendously on file size when inserting graphics. But it only works on graphics inserted as pictures linked to a file. If you edit the graphic with MS-Draw so that WinWord changes it to an embedded file, the macro will no longer have any effect

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fields to actual images instead. But be careful not to break a link unless either you're sure you won't need to edit the graphic again or you can edit it in MS-Draw.

If you really want to cut file sizes down to the absolute minimum, you should be aware of another option. The PSS.DOC file that comes with WinWord 2.0c offers a macro that will allow you to store graphics as external files — a trick that will cut down on file size drastically. The single macro LoadSavePictures replaces the Save Small and LoadSmall macros that come with Version 2.0a and 2.0b. (Note that you can upgrade to Version 2.0c from 2.0b at no charge. Upgrades from earlier versions cost $25. Call Microsoft on (02) 870 2100).

To install the macro, open PSS.DOC. (If you chose a full install when you originally installed WinWord, you should be able to find the file in your WinWord program directory). Browse through the list of macros until you find the Install macro, and double-click on its RUN macro button.

The Install macro will show you a message box. Choose okay. Then, in the dialogue box that follows, highlight LoadSavePictures in the list box on the left and accept Normal as the template to install to, in the list box on the right. Then choose okay. If you don't already have a NORMAL.DOT template, the macro will ask if you want to create one. Answer Yes, then Yes again to save the global glossary and command changes. The next dialogue box gives you the option to designate a menu and shortcut key for the LoadSavePictures macro. The Install macro takes care of everything else.

LoadSavePictures works only with graphics inserted with an IMPORT field. (WinWord automatically creates an Import field if you use Insert | Picture and check the Link To File check box). To use it, run LoadSavePictures before saving a file and choose the Compress button in its Linking Pictures dialogue box. When you do this, the macro finds all IMPORT fields in the file and modifies them so that they can no longer import a graphic.

As shown in Figure 2, if you save a file after running the macro, you wind up with a considerably smaller file — 2271 bytes compared with the 156,389 bytes just for inserting the PCX test file. Of course, you still need the original PCX file on-disk, but the PCX file for these examples is only 32,496 bytes, so the total disk space required is still far less than when you insert the graphic image itself without a field.

To change the IMPORT fields back to their original form, you can reopen the file, run the macro again, and choose the Restore button on the macro dialogue box. Or you can load the file and restore the graphics in a single step by running the macro and choosing its Open button.

Note too that if you start with a graphic that's placed in a document as an IMPORT field, and then edit it with MS-Draw, WinWord will convert the result to an EMBED field. You can then break the link to MS-Draw with Ctrl-Shift-F9, but the LoadSavePictures macro will no longer have any effect on that graphic.

Another choice is to modify the external file with a program other than MS-Draw — such as Paintbrush. This way, the IMPORT field will import the modified version the next time you run LoadSavePictures or otherwise update the field.

M. David Stone

Loading ASCII files into WordPerfect

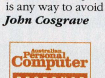
I have problems maintaining formats when loading ASCII text files into WordPerfect 5.1. The typical file I import consists largely of paragraphs of continuous text, in lines of 80 characters each. In addition, there are some columns that look much like a memo heading, taking the following form:

```
To: Name
Street Address
City, State
From:Name
Street Address
City, State
```

The To and From begin at the first character of the line. The rest of the text is indented seven characters.

I find two problems whenever I load such files into WordPerfect using the standard retrieve function. First, there is a hard carriage return (**[HRt]**) at the end of every line, rather than at the end of each paragraph. Second, the indented columns are slightly misaligned — enough to be noticeable when printing with the Dutch Roman 10-point font I've set as the default. I can fix the alignment and delete the hard returns manually, of course. But I work with imported files frequently, and I wonder if there is any way to avoid the problem.

John Cosgrave



If you have control over the source for the documents, you may be able to eliminate reformatting entirely. Otherwise you can use a macro to automate this tedious chore. Either way, it helps to understand what causes the problems you describe — both of which stem from what's in the ASCII file in the first place.

WordPerfect does not add the hard carriage returns; it simply lets you see them if you type Alt-F3 for Reveal Codes. Look for an option in the source program for creating the files without hard returns. Word 5.0, for example, can save a file as either Text-only, or as Text-only-with-line breaks, which adds a hard return after each line.

If you can't eliminate hard returns at the source, you may be able to strip them when you import the file into WordPerfect. Instead of using the retrieve command — with Shift-F10 or F5 — try using Ctrl-F5 for Text In/Out, then choose DOS Text | Retrieve (CR/LF to [SRt] in HZone). This works best with a block format — where you have paragraphs containing no carriage returns separated by blank lines that consist of a hard carriage return alone. For formats that only separate a paragraph by ending it with one hard return and beginning the next with an indent, the hard return that ends paragraphs often disappears when you use this method.

The loss of column alignment comes from defining column placement with space characters and then using a proportionally spaced font. Quite simply, the second column is indented by seven characters on each line. But with proportional spacing, the width of characters varies, so the indentation varies as well.

Here again, you may be able to eliminate the problem right at the source, if you can use tabs rather than spaces to define the beginning position for the indented column. (Unfortunately, some applications won't let you use tabs for this purpose). Notice that in the sample format, you need to treat the colons as being in their own columns, because of the space between the end of the word and the colon. After importing the file into WordPerfect, you can adjust the tab placement as needed.

If using tabs isn't possible, consider printing the files with a monospace font such as Courier. This will automatically align the columns, because each character is the same width. And that means an indent of any given number of characters will always translate to the same size indent.

If all else fails, you can record one or more macros for reformatting. The details will depend on what the files look like, but the trick is to use the search-and-replace command. Because the concept works for virtually any word processor, I'll outline the logic you should follow, rather than give keystroke-by-keystroke instructions.

For example, to reformat the first line in the memo format as shown, you would search for the word *To* followed by three spaces, a colon, and a space and replace it with *To* followed by a tab, a colon, and a tab.

To get rid of unwanted hard carriage returns, you should first provide markers for the hard returns you want to keep. If each paragraph starts with five spaces, you would search for a hard return followed by five spaces and replace it with @ (or another symbol you know isn't otherwise in the file) followed by a tab. You can then search for

hard carriage returns and replace them with nothing, then finally add back the hard returns you need by searching for @ and replacing with hard returns. If you record this entire procedure as a macro, you can then run it in any similar file to get the formatted result.
M David Stone

Speed up equation editor in WinWord 2.*x*

The Equation Editor that comes with Word for Windows 2.0 is useful for inserting complex formulas. However, repeatedly loading and exiting Equation Editor can get tiresome, since loading the program can take several seconds. Fortunately there's an easy way to speed up the process.

Start with the cursor positioned anywhere in the document where you do *not* want an equation, and load Equation Editor (by choosing Insert | Object | Equation). Then minimise the window (by clicking on the Minimise button or by opening the Control menu and choosing Minimise).

You can now insert equations wherever you want them by calling up Equation Editor as needed and closing each Equation Editor window as you finish with it. Because one instance of Equation Editor is already loaded in memory, you'll find that the loading time is reduced drastically. The only other difference is that every time you save your file, WinWord will ask if you want to update it first. It doesn't matter what you answer, since the question refers to the minimised window that doesn't actually include an equation.
Giacomo Bonanno

Australian Personal Computer RESPONSE

On my 486/25, this trick puts the time for opening an Equation Editor window down from about five seconds to well under one second. That's enough to matter on a document that's full of equations. As you might suppose, you can get the same effect by simply minimising rather than closing the first equation you work with in a given session. However, leaving the minimised window empty leaves less room for confusion if you switch among windows.

Note that for even greater convenience you can combine this approach with a macro for opening Equation Editor. Attach the macro to a toolbar button or shortcut key, and you can open Equation Editor with a single click or keystroke.
M David Stone

Spreadsheets

Externalised lookup tables in 1-2-3

Having recently discovered the power of 1-2-3's @VLOOKUP function, I set about creating applications in which a part number is entered on a worksheet and a corresponding unique description is 'looked up' and entered into an adjacent cell. Things were going great until the list of part numbers began to grow and the 'unique' descriptions started undergoing frequent modifications. Then the lookup applications themselves began to proliferate, and I found myself recreating the parts list in lots of different worksheets.

To cope with all this disarray, I decided to put the lookup table in a single external worksheet and then reference this external sheet from within my lookup applications. I call the external sheet MASTER.WK1. Then, in each of my lookup worksheets, I duplicate the table with linking formulas.

For example, if my table occupies the range A1..B1000 in MASTER.WK1, I start by putting the formula +<<MASTER.WK1>>A1 in cell A1 of my first lookup worksheet. Still in the lookup sheet, I copy A1's formula into A2..A1000 and B1..B1000. Then, elsewhere in the same sheet, I can write @VLOOKUP formulas that get the correct values from the lookup table.

Because cells A1..B1000 of my lookup worksheets always match the same range in my external worksheet, whenever the parts list grows or changes, I only need to modify it in one place. All the referencing worksheets are automatically updated.
Andrew Doherty

Australian Personal Computer RESPONSE

Anytime you find yourself making use of the same data in multiple worksheets, it's a good idea to 'externalise' that data. Even if the data resides in a spreadsheet file, think of that file as a database. Let your spreadsheet do what it does best — analyse and present — and keep the data out ondisk. Along with the efficiencies mentioned in Mr Doherty's letter, this approach gives you better security. To protect against accidental or mischievous changes, for example, you can password-protect the data file or assign it read-only status. The first step in Mr. Doherty's lookup procedure — copying the complete table into the lookup worksheet — is necessary only in the Release 2 variants of 1-2-3. In 1-2-3, Release 3.*x*, or 1-2-3 for Windows, you can eliminate this step and simply supply an external file reference as the table argument of the lookup formula. For example, in 1-2-3 for Windows, your formula might look like this:

```
@VLOOKUP (8, <<\123\DATA\
MASTER.WK3>>
A;A1..A:B100,1)
```

This formula would behave exactly like any other @VLOOKUP formula, except that it would use an external range — A1..B100 in the worksheet \123\DATA\MASTER.WK3 — as the lookup table.
Craig Stinson

Naming names

I enjoy reading the Solutions column and am always pleased to find Excel macros in the Spreadsheets section. The EMBOSS .XLM macro in the June 1993 issue caught my attention, so I tried it out. In doing so, I discovered some problems.

It seems that you overlooked a basic rule of Excel — namely, do not use names in a document that duplicate function names. The names **Result** and **Effect** violate this rule, and while the name **Result** appears to have no negative effects, the name **Effect** does — if you have the Analysis ToolPak add-in macro installed. In fact, you can't even type in the statement

```
=if(Effect=1)
```

in cell B11 without the name **Effect** changing to the function EFFECT when you press the Enter key. The net result is that you can never 'recess' a selection, because the IF statement in B11 is never true. This can be remedied by choosing another name such as **Effects** and changing all references to that name.

As for the name **Result**, it too should be changed. Even though the macro seems to work using that name, I would not be surprised if someone had problems with it.
Steve Luckey

Australian Personal Computer RESPONSE

Mr Luckey is right that you should avoid assigning the names of functions to cells, ranges, values and whatnot. With spreadsheet programs' function libraries growing richer every year, this rule is getting harder to observe. I admit to having never used the EFFECT( ) function and thus having overlooked the name duplication.

On the other hand, the difficulty that Mr Luckey encountered in recreating Scott Webb's Emboss macro is itself the consequence of a design peculiarity in Excel 4.0. Excel is supposed to tolerate the application of function names to worksheet and macrosheet cells, provided that those names don't include parentheses. And if you define the name Effect on your macro sheet before typing in any of the macro code, you won't experience the problem described by Mr. Luckey. (Mr Webb evidently built his macro this way).

But Excel 4.0 is also programmed to watch vigilantly for the names of Microsoft-supplied add-in functions and to run out to disk and grab the appropriate .XLA file the moment it sees one of those names. If you type **=Effect** on a macro sheet without having first defined **Effect** as a name, Excel will immediately load the add-in macro ANALYSF.XLA and will assume you're referring to the function **EFFECT( )**. The same thing happens if you type an equal sign followed by the name of one of the functions in ADDINFNS.XLA, such as **randbetween**. What's peculiar here is that the disk fetch occurs even if all you type is the keyword, without the parentheses.

The reason the name Result did not create a problem for Mr Luckey is that the RESULT() function is built into the EXCEL.EXE file, rather than being part of an add-in macro. You can use names such as **Sum**, **Max** and **Result** wherever you like without sending Excel to disk or damaging your macro code. On the other hand, as Mr Luckey observes, such a practice is bad form and liable to get you into trouble.

Craig Stinson

Databases

Design PAL dialogues using PaintPAL

Australian Personal Computer RESPONSE

Paradox 4.0 introduced a new event-driven user interface model that lets you design and use dialogue boxes in your PAL applications. A dialogue box, as you may already know, is a type of window that can be used to solicit information from the user. It contains controls — objects that a user can manipulate, such as push buttons and check boxes.

To create a custom dialogue box, you place the PAL SHOWDIALOG command in your PAL script. A simple example follows:

```
SHOWDIALOG "Dialog Example"
   @2,23 HEIGHT 6 WIDTH 32

   PUSHBUTTON @1,12 WIDTH 6
      "Ok"
      VALUE "Ok"
      TAG "OkButton"
      TO cOkButton
ENDDIALOG
```

This example displays a dialogue box that contains a single push button. Let's take a moment to examine this SHOWDIALOG command. You can probably guess how Paradox interprets the first three lines. First, a dialogue window titled 'Dialog Example' is opened at row 2, column 23. The dialogue is six rows high and 32 columns wide. Next, a 6-character-wide push button is created inside the dialogue window at row 1, column 12. The line that follows PUSHBUTTON specifies the text to appear on the push button — in this case 'Ok'.

The VALUE keyword specifies the value to assign to a variable when the push button is pressed. The variable that receives the value is named using the TO keyword; in this case, the variable is named **cOkButton**. In our example, when the push button is pressed, the text string 'Ok' is assigned to **cOkButton**.

The TAG keyword assigns a name to the push-button control. The TAG name is passed as a parameter to certain PAL commands and functions and to dialogue-box procedures. A dialogue-box procedure is a special procedure you write that Paradox will call when certain events occur during dialogue-box processing. You specify the name of the dialogue-box procedure and the events that will trigger the procedure. When the procedure is called, Paradox passes it the TAG name of the active control.

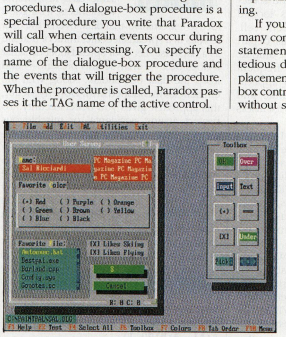


Figure 3: PaintPAL lets you draw your PAL dialogue boxes onscreen using its suite of toolbox tools, and then lets you generate the appropriate SHOWDIALOG code

Finally, the ENDDIALOG command denotes the end of the dialogue-box definition.

The SHOWDIALOG command lets you create push buttons, pick lists, radio buttons, check boxes, type-in boxes, and sliders, in addition to labels, static text, boxes, and painted regions. Each control requires a statement similar to the one shown above for PUSHBUTTON, though the number and type of keywords differ, depending on which control you're specifying.

If your dialogue box calls for the use of many controls, writing the required control statements can involve a great deal of tedious detail. It's quite difficult to get the placement, colour and size of the dialogue-box controls exactly the way you want them without seeing what the dialogue-box elements look like onscreen. You'll find yourself modifying the SHOWDIALOG code, running it to see whether the dialogue looks right, modifying it again, checking again, and on and on. This can be frustrating because just changing the code to experiment with positioning the controls in different ways can take quite a lot of time.

Unfortunately, relief from this tedious and time-consuming process is not available from within Paradox itself. When the folks at Borland International updated Paradox to support SHOWDIALOG,

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they did not include any corresponding support for dialogue-box design. The form designer, for example, does not support the new dialogue-box features.

This means that when using Paradox out of the box, you must manually adjust SHOWDIALOG statements. But fortunately there's another option. PaintPAL, a third-party product from Target Software, is an excellent standalone PAL dialogue-box designer that supports SHOWDIALOG. Using PaintPAL, you can paint your dialogue-box design onscreen and then let it generate the SHOWDIALOG code for you.

PaintPAL uses a Turbo Vision-style user interface and is easy to use. You design the dialogue box in a window and choose menu items from drop-down menus. A floating toolbar (shown in Figure 3) lets you click and drag controls onto your dialogue box, where you can resize them by dragging on the lower-right-hand corner of the control with the mouse. PaintPAL supports all of the controls, which can be chosen from a drop-down menu as well as from the toolbar.

To specify an object's properties, such as its variable name, tag name, and other required information, you simply click the right mouse button over the object. A dialogue appears that lets you fill in the options.

Once you've placed all of the objects in your dialogue, you can activate a test mode to test the dialogue's design from within PaintPAL. This lets you see the dialogue as it will appear within Paradox and allows you to interact with the controls as your application's user would. You can also verify and change the tab order — the order in which the cursor moves from field to field.

PaintPAL can 'validate' your design. That is, it can make sure that you've specified all the required properties needed to generate correct PAL code. This means you can quickly place a bunch of controls on a dialogue design and test it, without having to first specify all of the properties. Later, you can use the validate feature to help you go back and fill in the properties.

PaintPAL saves your dialogue design in a special binary file that has a .DLG file extension (you can place the design in a Paradox BLOB field if you like). When you generate PAL code, you can choose to send the code to a new file, an existing file, the screen or the Paradox editor. If you choose to send the code to an existing file, PaintPAL will automatically find and replace the existing dialogue-box code in the file with your new dialogue code. It can do this because it assigns a unique identifier to each dialogue box; it uses this identifier to find the previous version of the code you want to replace.

Most design tools that generate source code suffer from 'one- way' syndrome. You can generate source code from a design, but you cannot generate a design from source code. This means you cannot edit the generated source code directly because generating a new version with the design tool overwrites the changes that you made directly to the code. Version 2.0 of PaintPAL, released in May, includes a remarkable feature: it can build dialogue designs by reading your existing PAL source code and interpreting your SHOWDIALOG statements, whether they were created by PaintPAL or not. PaintPAL reads your source code and then presents a list of the dialogues it finds. You can then choose to import or merge one of these dialogues into your PaintPAL dialogues. Because of this feature, you can make changes to the source code directly and then read it back into PaintPAL in order to create an updated dialogue design. Version 2.0 also creates dialogue-box designs directly from tables or from Paradox forms.

The lack of a dialogue designer in Paradox 4.0 is a glaring omission that will drive you crazy if you spend any time designing dialogues. Listing at $250, PaintPAL elegantly solves this problem. If you'd like more information, you can contact Enhancement Solutions, the distributors of PaintPAL, on (02) 906 8581.

Sal Ricciardi

Graphics

Creating bleeds

I often use PageMaker 4.0 to create designs that place a photograph or a tint right up to or off the edge of the paper. When I print to my laser printer, though, I get a white band that surrounds the entire page. Is there any way — on my printer — to produce accurate proofs that show bleeds?

Mary Callahan



The problem you describe occurs due to a mechanical limitation found in all printers. Any such device — be it a laser printer, Linotronic imagesetter, or commercial press — must reserve a portion of the page to grip the paper and feed it through the mechanism. The white band you see around the edge of your page is simply this area, called the non-printing margin.

Every laser printer has a slightly different non-printing margin, but, luckily, there's an easy way to determine the safety needed for your particular printer. First, start a new publication in PageMaker. Make sure that the page size is exactly the same size as the paper in your printer; so if you're using letter-sized paper, choose the corresponding 8.5 by 11in page size. Now use the rectangle tool to draw a box that covers the entire page. Use the Element menu to fill the box with some printable tint or colour (any choice other than None or Paper). When you print the page, you'll see that familiar white area around the edge of the paper. Now whenever you plan a publication, be sure to create page margins that are at least as wide as these non-printing margins.

While this approach guarantees you accurate proofs, it means that you can never bleed an element off the edge of the paper. (For those unfamiliar with this term: To create a bleed, you must print an image so that it extends past the crop marks that define a page. Although it gets printed, the excess image is cut off when the page is trimmed, making it look as if the image has been positioned precisely on the edge of the paper.)

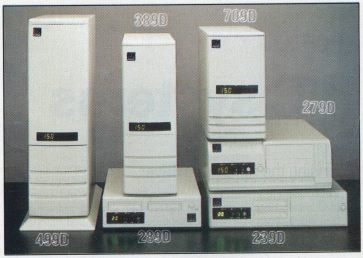
If your aesthetic sense demands that you include a bleed in your designs, you'll find that you have only two options for laser-printed proofs. You can invest in a laser printer that supports ledger-size (11 by 17 in) paper, but the cost may be prohibitive. Or you can take advantage of PageMaker's ability to scale a document at print time. By reducing the size of your design only slightly, you can fit an entire page, complete with bleeds and crop marks, on standard letter-sized paper. Scaling a document at print time is simple. Invoke the Print command and, when the Print dialogue appears, enter a value in the Scaling text box. Anything from 25 per cent to 1000 per cent is acceptable, but I've found that 80 per cent of the original size is small enough to fit all of the design elements on the paper, yet large enough to let you proofread text. By the way, Page Maker's scaling option will work for both PCL and PostScript printers.

Luisa Simone

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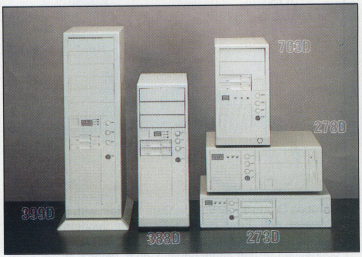
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PC systems

Finding the right video driver

I purchased a 386DX/33 computer system in October, 1992. It came with high-resolution video drivers for Windows 3.0 but not Windows 3.1, which I have since purchased. The company that sold me the system told me that the drivers shipped with the system work fine with Windows 3.1. When I explained that the drivers weren't working on my machine, they seemed unable to suggest a solution. How can I get high-resolution drivers that work?

Edgar Haecker

Australian Personal Computer RESPONSE

There are a number of places to find video drivers. Chances are good that your video adaptor was sold as a component to the manufacturer of your system. Open the case and examine the card for any copyright markings that might indicate the original manufacturer. You can then contact that company directly; many have bulletin board systems where you can download the latest drivers.

If you can't determine the board manufacturer, try the VGA chipset manufacturer. The chipset will be one of the largest chips on the board, and likely candidates include ATI Technologies, C3, Cirrus, Tseng Laboratories, Weitek and Western Digital.

Manufacturers have different policies about providing drivers and support for end users. For example, Tseng doesn't support end users, since it feels that's the responsibility of the board manufacturer. As a service, however, the company does post some generic drivers on CompuServe (GO TSENG).

If you still haven't found what you need, check the Video Drivers library in Microsoft's WINADV (Advanced Windows) Forum on CompuServe, where you'll find the latest versions of drivers for a wide range of boards and chipsets.

Finally, Panacea publishes a product called WinSpeed, which is a collection of drivers designed to get optimum performance in 256-colour modes for a variety of the most commonly used video chipsets. WinSpeed is distributed by SealCorp Computer Products who can be contacted on (02) 319 4611 for more information.

Alfred Poor

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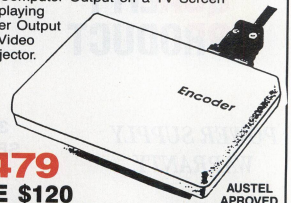
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Peripherals

Post-its make printing easier

I often have to feed single sheets of card-stock paper into my dot-matrix printer. Usually, it will give an out-of-paper message before all the text is printed. Disabling the out-of-paper switch isn't a good solution; near the bottom of the page, the friction feed will fail, and the last few lines will be garbled.

My solution is to put two 3-by-3in Post-It notes on the back of the paper. I place them at the outer edges where they'll engage the friction-feed rollers and depress the out-of-paper switch. I'm also careful that all of the sticky part is attached to the paper so the Post-Its don't get stuck in the printer.

Robert LaFara

Australian Personal Computer RESPONSE

Chalk up one more use for those indispensable yellow pads! This is the most elegant and simple solution I've ever encountered. I used to disable the paper-sensing switches in my dot-matrix printers permanently by plastering them down with sticky mailing labels. I've also tried all sorts of page-carrier devices, but they always caused slippage and misalignment.

Fortunately, most modern dot-matrix printers either include a cut-sheet feeder or have one available as an option. But you'll probably still need to resort to this Post-It solution when using card-stock, which is stiffer than most sheet feeders can handle.

Laser-printer users may be interested in another variation: I use Post-Its to hold small pieces of paper, such as bank deposit slips, in place on regular letter-size sheets of paper for printing. For best results, use the straightest paper path your printer offers, such as manual feed and face-up output on an HP LaserJet Series II or other printer based on a Canon SX engine.

Alfred Poor

Networking

Running LANtastic 5.0 with a Xircom adaptor

I manage a 10-node LANtastic network that we recently upgraded from Version 4.0 to Version 5.0. I'd like to connect several salespeople who use laptop computers to the network.

I purchased a Xircom Pocket Ethernet Adaptor because I was told that Xircom had drivers for LANtastic. The company does, but only for Version 4.1. Xircom does not support Version 4.0, and it doesn't expect to support LANtastic 5.0 for several months. I can't even purchase Version 4.1 from Artisoft; they no longer sell it. What can I do?

Chan Martin

Australian Personal Computer RESPONSE

Artisoft's NDIS Support for LANtastic will allow you to use any network adaptor card that supports NDIS (Network Driver Interface Specification). The Artisoft product includes drivers for the Xircom Pocket Ethernet Adaptor as well as many other network adaptors.

Artisoft has recently announced that the product is available free from their bulletin board.

You can contact the Artisoft bulletin board on (02) 882 8877.

Frank J. Derfler, Jr.

Languages

Allocating extended memory

I recently needed to access more memory under Turbo Pascal than was available by defining a static array or allocating one on the heap. Since I have several megabytes of extended memory, I wrote the unit XMS.PAS (Figure 4) to provide access to extended memory.

For the routines to work, HIMEM.SYS — the extended memory driver that comes with either DOS or Windows — must be loaded. You must run the unit on a 286 or 386 machine equipped with more than 1M of memory. The seven Turbo Pascal functions in the program are commented and are self-explanatory. I've also supplied a sample test program, XMSTEST.PAS (Figure 5), that does the following:

- Verifies that the extended memory driver HIMEM.SYS is loaded.
- Displays the total extended memory.
- Displays the largest free extended memory block.
- Allocates an extended memory block of 512K to hold 131,072 long integers at four bytes each.
- Displays the memory handle returned.
- Displays the extended memory available after the 512K has been allocated.
- Fills the 512K extended memory area with the numbers 1 through 131,072.
- Reads and displays the first and last element in the 512K extended memory area just to show how it's done.
- Frees the 512K extended memory block

XMS.PAS


```
{---------- Extended Memory Access Unit ----------}
UNIT XMS;
{**} INTERFACE {**}
VAR
  XMSErrorCode : byte;     { Error Code - Defined in XMS Spec }
  XMSAddr      : Pointer;  { Entry Point for HIMEM.SYS Driver }

FUNCTION XMSDriverLoaded: Boolean;
FUNCTION XMSTotalMemoryAvailable: Word;
FUNCTION XMSLargestBlockAvailable: Word;
FUNCTION XMSAllocateBlock(KBSize: Word): Word;
FUNCTION XMSReleaseBlock(Handle: Word): Boolean;
FUNCTION XMSMoveDataTo(SourceAddr: Pointer; NumBytes: LongInt;
                       XMSHandle: Word; XMSOffset: LongInt): Boolean;
FUNCTION XMSGetDataFrom(XMSHandle: Word; XMSOffset: LongInt;
                        NumBytes: LongInt; LowMemAddr: Pointer): Boolean;

{**} IMPLEMENTATION {**}

TYPE
  XMSMoveStruct = record
    movelen   : LongInt;     { length of block to move in bytes }
    case integer of
      { Case 0 Variant for Low Memory to XMS }
      0: (SHandle    : Word;     { source handle - 0
                                   for conventional memory }
          SPtr       : pointer;  { source address }
          XMSHdl     : Word;     { XMS destination handle }
          XMSOffset  : LongInt;  { 32 bit XMS offset }
      { Case 1 Variant for XMS to Low Memory }
      1: (XMSH       : Word;     { XMS source handle }
          XMSOfs     : LongInt;  { starting offset in XMS}
          DHandle    : Word;     { 0 when conventional memory
                                   destination }
          DPtr       : pointer;  { address in conventional memory }
    END;

VAR moveparms : XMSMoveStruct;   { structure for moving to and
                                   from XMS }

{*********************************************************}
{ XMSDriverLoaded - Returns true IF Extended Memory Driver }
{                   HIMEM.SYS Loaded                       }
{                 - Sets Entry Point Address - XMSAddr     }
{*********************************************************}
FUNCTION XMSDriverLoaded: Boolean;
CONST
  himemseg: Word = 0;
  himemofs: Word = 0;
BEGIN
  XMSErrorCode := 0;
  ASM
    mov ax,4300h          { Check to see IF HIMEM.SYS installed }
    int 2fh
    cmp al,80h            { Returns AL = 80H IF installed }
    jne @1
    mov ax,4310h          { Now get the entry point }
    int 2fh
    mov himemofs,bx
    mov himemseg,es
  @1:
  END;
  XMSDriverLoaded := (himemseg <> 0);
  XMSAddr := Ptr(himemseg,himemofs);
END;

{*********************************************************}
{ XMSTotalMemoryAvailable - Returns Total XMS Memory Available }
{*********************************************************}
FUNCTION XMSTotalMemoryAvailable: Word;
BEGIN
  XMSErrorCode := 0;
  XMSTotalMemoryAvailable := 0;
  IF XMSAddr = nil THEN          { Check IF HIMEM.SYS Loaded }
    IF NOT XMSDriverLoaded THEN exit;
  ASM
    mov  ah,8
    call XMSAddr
    or   ax,ax
    jnz  @1
    mov  XMSErrorCode,bl  { Set Error Code }
    xor  dx,dx
    @1:
    mov  @Result,dx       { DX = total free extended memory }
  END;
END;

{*********************************************************}
{ XMSLargestBlockAvailable - Returns Largest Contiguous   }
{                            XMS Block Available          }
{*********************************************************}
FUNCTION XMSLargestBlockAvailable: Word;
BEGIN
  XMSErrorCode := 0;
  XMSLargestBlockAvailable := 0;
  IF XMSAddr = nil THEN          { Check IF HIMEM.SYS Loaded }
    IF NOT XMSDriverLoaded THEN exit;
  ASM
    mov  ah,8
    call XMSAddr
    or   ax,ax
    jnz  @1
    mov  XMSErrorCode,bl  { On Error, Set Error Code }
    @1:
    mov  @Result,ax       { AX=largest free XMS block }
  END;
END;

{*********************************************************}
{ XMSAllocateBlock - Allocates Block of XMS Memory        }
{                  - Input - KBSize: No of KilobyTes requested }
{                  - Returns Handle for memory IF successful  }
{*********************************************************}
FUNCTION XMSAllocateBlock(KBSize: Word): Word;
BEGIN
  XMSAllocateBlock := 0;
  XMSErrorCode := 0;
  IF XMSAddr = nil THEN { Check IF HIMEM.SYS Loaded }
    IF NOT XMSDriverLoaded THEN exit;
  ASM
    mov  ah,9
    mov  dx,KBSize
    call XMSAddr
    or   ax,ax
    jnz  @1
    mov  XMSErrorCode,bl { On Error, Set Error Code }
    xor  dx,dx
    @1:
    mov  @Result,dx       { DX = handle for extended memory }
  END;
END;

{*********************************************************}
{ XMSReleaseBlock - Releases Block of XMS Memory          }
{                 - Input:  Handle identifying memory to be }
{                   released                              }
{                 - Returns  true IF successful           }
{*********************************************************}
FUNCTION XMSReleaseBlock(Handle: Word): Boolean;
VAR OK : Word;
BEGIN
  XMSErrorCode := 0;
  XMSReleaseBlock := false;
  IF XMSAddr = nil THEN    { Check IF HIMEM.SYS Loaded }
    IF NOT XMSDriverLoaded THEN exit;
  ASM
    mov  ah,0Ah
    mov  dx,Handle
    call XMSAddr
    or   ax,ax
    jnz  @1
    mov  XMSErrorCode,bl  { On Error, Set Error Code }
    @1:
    mov  OK,ax
  END;
  XMSReleaseBlock := (OK <> 0);
END;

{*********************************************************}
{ XMSMoveDataTo - Moves Block of Data from Conventional   }
{                 Memory to XMS Memory                    }
{               - Data Must have been previously allocated }
{               - Input - SourceAddr : address of data in }
{                         conventional memory             }
{                       - NumBytes   : number of bytes to move }
{                       - XMSHandle  : handle of XMS Block }
{                       - XMSOffset  : 32 bit destination }
{                                      offset in XMS Block }
{               - Returns true IF completed successfully  }
{*********************************************************}
FUNCTION XMSMoveDataTo(SourceAddr: Pointer; NumBytes: LongInt;
                       XMSHandle: Word; XMSOffset: LongInt): Boolean;
VAR Status    : Word;
BEGIN
  XMSErrorCode := 0;
  XMSMoveDataTo := false;
  IF XMSAddr = nil THEN { Check IF HIMEM.SYS Loaded }
    IF NOT XMSDriverLoaded THEN exit;
  MoveParms.Movelen  := NumBytes;
  MoveParms.SHandle  := 0;      { Source Handle=0 For
                                  Conventional Memory}
  MoveParms.SPtr     := SourceAddr;
  MoveParms.XMSHdl   := XMSHandle;
  MoveParms.XMSOffset := XMSOffset;
```

Figure 4: The functions in this Turbo Pascal 6.0 unit let you allocate and de-allocate chunks of extended memory for use as program data storage

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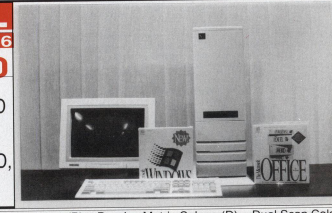
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All come with: 4Mb RAM, 120MB HDD, Logitech Mouse, SCSI Port, SCSI Cable, Carry Case, Car Adapter, DOS 6.

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XMS.PAS 2 of 2

```
ASM
  mov  ah,$8h
  mov  si,offset MoveParms
  call XMSAddr
  mov  Status,ax          { Completion Status }
  or   ax,ax
  jnz  @1
  mov  XMSErrorCode,bl { Save Error Code }
  @1:
END;
XMSMoveDataTo := (Status <> 0);
END;

{*************************************************************}
{ XMSGetDataFrom - Moves Block From XMS to Conventional Memory }
{                - Data Must have been previously allocated    }
{                  and moved to XMS                            }
{                - Input - XMSHandle  : handle of source       }
{                                      XMS block               }
{                          XMSOffset  : 32 bit source offset    }
{                                      in XMS block            }
{                          NumBytes   : number of bytes to move }
{                          LowMemAddr : destination addr in     }
{                                       conventional memory    }
{                - Returns true IF completed successfully      }
{*************************************************************}
FUNCTION XMSGetDataFrom(XMSHandle: Word; XMSOffset: LongInt;
         NumBytes: LongInt; LowMemAddr: Pointer): Boolean;
VAR Status     : Word;
BEGIN
  XMSErrorCode := 0;
  XMSGetDataFrom := false;
  IF XMSAddr = nil THEN   { Check IF HIMEM.SYS Loaded }
    IF NOT XMSDriverLoaded THEN exit;
  MoveParms.MoveLen := NumBytes;  { Set-Up Structure to Pass }
  MoveParms.XMSh    := XMSHandle;
  MoveParms.XMSOfs  := XMSOffset;
  MoveParms.DHandle := 0;                { Dest Handle=0 For
                                           Conventional Memory}
  MoveParms.DPtr    := LowMemAddr;
  ASM
    mov  ah,$8h
    mov  si,offset MoveParms
    call XMSAddr
    mov  Status,ax          { Completion Status }
    or   ax,ax
    jnz  @1
    mov  XMSErrorCode,bl { Set Error Code }
    @1:
  END;
  XMSGetDataFrom := (Status <> 0);
END;

BEGIN
  XMSAddr      := nil; { Initialize XMSAddr }
  XMSErrorCode := 0;
END.
```

XMSTEST.PAS Complete listing

```
{$X+}
Program XMSTest;
USES crt, XMS;
CONST
  NumVars     = 131072;   { 131072 total no of variables in array }
  BytesPerVar = 4;        { ie. 2 for integers, 4 for LongInts ...}
VAR
  I      : LongInt;
  Result : LongInt;
  Hdl    : Word;          { Handle for Extended memory allocated }
  HiMemOK : boolean;
BEGIN
  ClrScr;
  HiMemOK := XMSDriverLoaded;
  WriteLn('HIMEM.SYS Driver Loaded=', HiMemOK);
  IF NOT HiMemOK THEN Halt;
  WriteLn('Total Extended Memory: ', XMSTotalMemoryAvailable, ' KB');
  WriteLn('Largest Free Extended Memory Block: ',
                XMSLargestBlockAvailable, ' KB');

  {Allocate Memory - Hdl is memory block handle or identifier}
  Hdl := XMSAllocateBlock((NumVars * BytesPerVar + 1023) DIV 1024);
         {1023 to Round Up to next KB}
  WriteLn((NumVars * BytesPerVar + 1023) DIV 1024,'KB Handle=',Hdl);
  WriteLn('Total Extended Memory Available After Allocation: ',
                XMSTotalMemoryAvailable, ' KB');

  { Fill the variables with 1 ... NumVars for exercise }
  WriteLn('Filling Memory Block ');
  FOR I := 1 TO NumVars DO
  BEGIN
    { parameters in Move Data are - Address of Data to Move
                                  - Number of Bytes
                                  - Memory Handle
                                  - Offset in XMS Area }
    IF NOT XMSMoveDataTo(@I, BytesPerVar, Hdl, (I - 1) *
      BytesPerVar) THEN
      WriteLn('Error on Move to XMS: ',I,' Error: ', XMSErrorCode);
    IF I MOD 1024 = 0 THEN Write(I:6,^M);
  END;
WriteLn;
{ Now read a couple of locations just to show how}
I := 1;  { First Element }
IF NOT XMSGetDataFrom(Hdl, (I - 1) * BytesPerVar,
  BytesPerVar, @Result) THEN
  WriteLn('Error on XMSGetDataFrom');
  ELSE WriteLn('XMS Data [',I,']=',Result); { Print it }
I := NumVars;  { Last Element }
IF NOT XMSGetDataFrom(Hdl, (I - 1) * BytesPerVar, BytesPerVar,
  @Result) THEN
  WriteLn('Error on XMSGetDataFrom')
  ELSE WriteLn('XMS Data [',I,']=',Result); { Print it }

WriteLn('Release Status=', XMSReleaseBlock(Hdl));
WriteLn('Press a key.');
ReadKey;
END.
```

Figure 5: This program exercises the XMS unit by allocating a 512K block of memory, moving 512K of data into it, and verifying that the data was correctly stored

using the handle returned when it was allocated.

Special thanks to Ray Duncan and chapter three of his excellent book *Extending DOS*, which provided the necessary insight into using the extended memory driver HIMEM.SYS.

Allen M. Butler

Australian Personal Computer RESPONSE

Even on my fast 486 machine, individually moving 131,072 Long Ints into extended memory took a long time — long enough that I wondered if the program had crashed. I added a line that writes the current value of variable I once for every 1024 numbers so the program can clearly demonstrate that it's functioning. Interestingly enough, loading EMM386.EXE sped up the program by a very substantial margin.

HIMEM.SYS itself is not specifically required; another extended memory manager like QEMM.SYS will work fine. Running under QEMM.SYS, the program appeared even faster than when running under the combination of HIMEM.SYS and EMM386.EXE.

Turbo Pascal programs can't just allocate data structures on the XMS 'heap' and access them like other dynamic structures; it's necessary to move the data into conventional memory when you want to use it. The best use for this XMS storage is for temporary program data that would otherwise have to be stored in a file.

Both of these programs are available from MagDisk (refer to page 186 for details).

Neil J. Rubenking

THE MAGAZINE FOR PC BUYERS

PC Super Market

NOVEMBER 1993

Buyer's guides:
Mouse devices
Digitisers
Keyboards
Dot-matrix printers

Guide to buying direct

Part 3: Knowing what you paid for

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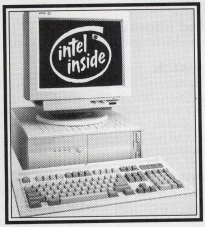
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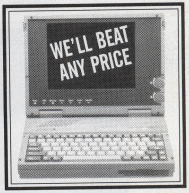
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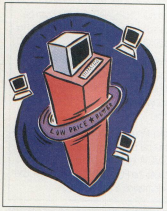
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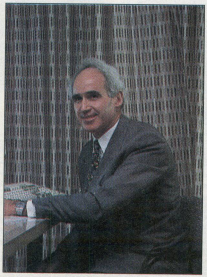
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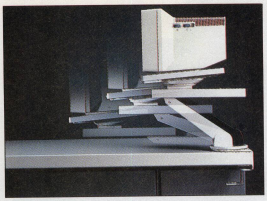
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PC Super Market
NOVEMBER 1993

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Genius ***HiPen*** transforms your old keyboard-based PC into a powerful pen-based system. Your handwriting will be instantly converted into type. With pad and pen. Just the way you've always worked. But with a totally new dimension of productivity.

For ultimate desktop freedom, we've created a mouse with no tail – the ***HiMouse Cordless***. Its infrared beam will keep your PC in line. From up to 6 feet away.

With our new ***HiScan*** hand-held scanners, you get more hot Genius features than ever before. And intelligent software muscle you won't find anywhere else. Like precise optical character recognition and professional image processing software. So now your images and text will come out even more brilliantly than when they went in.

But without smarter input, how could anyone expect genius output?

INTELLIGENT INPUT FOR BRILLIANT OUTPUT.

TOTAL CONTROL. NO STRINGS ATTACHED.

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PC ⇦ JUNCTION®

- PC JUNCTION - The World Class Mail Order Computer Supermarket!
- The Most Efficient Mail Order System - Now Available in Australia
- The best Service to Your Door - Overnight Almost Anywhere
- Service Like You've Never Had Before
- We Carry The Biggest Range In Australia In Stock - over 8,500 different products
- We Despatch Within Two Hours Of Receipt Of Your Order
- Our parent company is 21 years old this year with 17 of those in the high end of the computer industry - so we must be doing a lot of things right

Software

Special and very strict conditions apply to all Education, Crossgrade and Upgrade Pricing.

Miscellaneous Software

ACCPac Simply Accounting $229
Adaptec EZI-SCSI to run CD ROMS from Adaptec controllers $157
Borland Paradox Windows $275
Clarion Personal Developer - a brilliant database developer for novice programmers - simply amazing $150
CorelDraw 4 Updated Version $577
Corel SCSI $149
Kodak Photo CD "Access" Software with Photo Sampler $89
MS Flight Simulator v5 NEW $79
Norton Desktop DOS $75
Norton Utilities v7 Academic $144
Procom Plus Windows $189
SpeedCache for CD ROM $179
Winfax Pro v3 A clever product . $199

Hardware

CD ROM PLayers

NEC CDR-74-1 Ext. SCSI $931
NEC CDR-84-1 Int. SCSI The Best!$862
NEC 8 bit SCSI Controller $190
NEC CDR-25 Portable Ext SCSI. . $478
Panasonic AT bus w/controller .. $436
Panasonic SCSI w/controller $514
Panasonic SCSI-2 - MPC and Photo CD Multi Session compatible $567
Sony CDU-561 Int. SCSI HiSpeed$871
Sony Ext. SCSI HiSpeed $1190

Disk Controllers

Adaptec 1522M SCSI $156
Adaptec 1542CK complete kit $453
AMI FastDisk Caching FAST SCSI-2 - the fastest PC controller there is $1015
BusLogic FAST SCSI-2 VLB with Burst Modes to 33 mb/sec $637
Intelligys Caching ISA IDE $231
Intelligys Caching ISA VLB $336
Promise VLB w/2 x ser.,1 x par and runs 2 x floppies+2 HDD $149
Promise DC200 Caching ISA IDE $239
Promise Caching ISA SCSI-2 - We unreservedly guarantee this to speed up a SCSI system $399

Disk Drives

Teac Dual Floppy-Half Height $260
Floppy Drive 3.5"1.44mb $82
Quantum 170mb ELS IDE $389
Quantum 240 LPS IDE $554
Quantum 525mb AT/IDE — the fastest drive available. Couple this with our caching controller to make your PC a real BRUTE $1326
Quantum 240mb FAST SCSI-2 ... $578
Quantum 525mb FAST SCSI-2 . $1350
Quantum 1.05gb FAST SCSI-2 . $2012
Syquest 44mb Int. $530
Syquest 88mb Int. $601
Syquest 88mb Ext. $775
Syquest 105mb 3.5" Int. New and very very fast $851
Syquest 88mb disk $199
Syquest 44mb disk ..... $133!

Fax Modems

Avtek MegaPlus V32.bis fax $634
Banksia v22.bis -9600S/R $299
Banksia MX6 V32.bis fax APC Editor's Choice $819
Intel SatisFaxtion CAS FaxModem - this is the ultimate faxcard $1057

The Multi Award Winning SONY CPD-1730 17" - for use on either Mac or PC. This monitor is a real stunner!

- Unheard of 17" crispness and clarity .25 dot pitch Trinitron
- 75 Hz refresh - flicker free
- Digital microprocessor control
- Anti reflection mask
- Meets strict MPR-II Low Radiation standards
- Flat square screen
- Priced at a low $2,499 Tax Inc.



Microtek Scanmaker II - They're Back In Stock at PC JUNCTION and Selling Fast!



- **Speed** - Faster than all their peers using SCSI
- **Size** - The smallest desk top flatbed scanner yet
- **Resolution** - 1200 dpi
- **Colour** - Full 24 bit 16,700,000 colours + 256 Greyscale as well as line art too
- **Scan Size** - Up to 8.5" x 13.5"
- **OCR** - Automatic document feeder and OCR Pack available

Call the Hotline and get one now complete with ImageStar for Windows colour processing software, for $2,310.00

Spirit II V32.bis-9600SR fax $566
Spirit V.32bis Pocket Fax Modem - What a rocket this little demon is $680

Graphic Boards

Actix ProStar G. Engine VLB 1mb 32 bit Windows accelerator with 16 mill. colours and up to 90 Hz refresh . $337
Actix G E Ultra PLUS 1mb ISA ... $638
Actix G E Ultra PLUS 2mb ISA ... $811
Actix G E Ultra PLUS 2mb VLB .. $965
ATI Graphics Ultra $413

Promise DC420 VLB Caching - New on the market with incredible data transfer rates to 15.6 mb/se. Includes 512K RAM, 2 x serial and 1 x parallel as well as 2 x floppies and 2 x hard drives
Phone NOW $299

ATI Graphics Ultra+ 2mb $426
ATI Graphics Ultra Pro 2mb $685
ATI Graphics Ultra Pro EISA 2mb$752
ATI Graphics Ultra Pro 2mb VLB $685
Diamond Stealth 24 ISA $383
Diamond Stealth 25 VLB $410
Diamond Stealth Pro ISA 2mb $779
Diamond Stealth Pro VLB 2mb .. $787
Diamond Stealth Viper VLB - this is the quickest of the lot $945
Media Vision PG 1024 4mb $1373
Media Vision PG 1280 4mb $1584
TsengLabs MegaEva 16 bit VLB . $293

Mice

Honeywell Serial - the last mouse you'll ever need - Lifetime Warranty $129
Honeywell Serial - No software $88
Logitech Portable Trackman $151
New Microsoft Serial Mouse $121
MS Serial Mouse No software $69
Microsoft Ball Point $155

Monitors

Sony 14 Trinitron .25 DP The very best 14" in the business $1057
Sony 17 Trinitron .25 DP Wow .. $2096
Sony 20 - There is no equal $5610
ViewSonic 6FS 15" $844

Attention PC JUNCTION NOW DOES MicroArts Computers!

ViewSonic 15 The best 15 ..... $1037
ViewSonic 17 ..... $2455

Multi Media Kits

MV CD Fusion 16 with Pro Audio Spectrum 16, speakers and Library ... $799
MV CD Double Fusion NEC Int . $1157
Sony MM Starter Kit Int. $689
Sony MM Desktop Library Int. ... $1081
Sony MM Desktop Library Ext. . $1352

Networking

NE2000 Card Novell Approved ... $139
SMC Ethercard Plus 16 ..... $210
Lantastic DOS Starter Kit $806
Lantastic Windows Starter Kit ... $940
Lantastic Z Kit $140
Lantastic AI Pack $113
Pocket Adapter Xircom Comp. ... $385
Novell Netware - Hot prices ..... Call!

Stop Press! The new Sony CD ROM Drives are here:

- ★ Fully MPC Compliant
- ★ Kodak Photo CD Multi Session compatible
- ★ And Now Super High Speed Double Speed
- ★ Can be run with a Sony Bus Media Vision Pro Audio Spectrum or High Performance Digital Sound Cards such as the Cardinal
- ★ Buy just the CD ROM drive or ask about our great Sound Card + Drive bundles
- ★ Prices start at a low $420.00

Visit our Computer Supermarket at 153 Victoria Ave., Chatswood, NSW

Introducing to Australia the Cardinal®
Digital Sound Pro 16™ Sound Card System

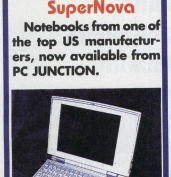
Printers

Texas Instruments MicroPrinter Laser NEW! 5ppm - just arrived $1199

TI MicroPrinter PostScript 65 Adobe Type 1 fonts, + 2mb RAM $2045
TI Postscript - new model 600dpi and 26 Adobe fonts - 8+ ppm $2999
TI Postscript 600dpi and 65 Adobe fonts - 8+ ppm $3616
Calcomp Full Process Colour A4 Postscript Printer from the USA $9910
Mitsubishi full colour printers on special now ..... Call

Andromeda SuperNova

Notebooks from one of the top US manufacturers, now available from PC JUNCTION.



- A quick 486SLC-25 and a super quick 486DX2-66 in the new Andromeda SuperNova lineup
- Super sharp "High Focus" dual LCD and CRT displays to 800x600
- Passive and Active Matrix full colour available
- 1mb VRAM on SVGA
- PCMCIA slots available
- Up to 200mb Auto Sensing super FAST .5" high removable and exchangable Quantum hard drives
- Innovative super modern battery system
- Built in Trackball option
- Exclusive spring mounted keyboard
- Unsurpassed reliability - from America's Mobile Technology company
- These notebooks were specifically designed for the rigours of the US military
- Lots more great features
- All models come with a beautiful black attache case
- Prices start from a low

Tax Inclusive $2799

Scanners

Logitech 256 Grey Scale $339
Logitech 256GS w/Omnipage $383
Logitech Colour Hand Scanner .. $765
Microtek Scanmaker II 1200dpi 24 bit A4 Flatbed - Magnificent $2263
Microtek T35 3600 dpi 24 bit Colour 35mm Transparency Scanner ... $3599

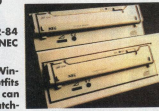
Sound Cards

Cardinal Digital Sound Pro 16 - The most outstanding card on the market at present. Can be run with a Sony AT Bus or most SCSI CD ..... ROMS $439
Pro Audio Spectrum 16 Bit Stereo Standard $299
Pro Audio Spectrum 16 Bit Stereo DeLuxe $369
Pro Audio Spectrum Studio 16 Bit Stereo - Voice Recognition $433
Media Vision PowerPak Software Upgrade for Pro Audio Spectrum 16 to ProAudio Studio $135

Tape Backup

Colorado Jumbo 120 Int. $299
Colorado Jumbo 250 Int. $367
Colorado Jumbo 250 External . $559
Colorado Trakker 120 Portable $599

NEC and KODAK Photo CD - They're Where The Action Is This Month - KODAK Photo CD has now been released, and you need a Guaranteed Multi Session Compatible drive to run it. If the drive you buy *PRETENDS* to be compatible, then you *can't* be guaranteed to run Photo CD Multi Session.



Choose from the NEC CDR-84 Multispin Internal OR the NEC CDR-74 External.

Whether you're running Windows NT, Multi Media outfits or Kodak Photo CD, we can supply NEC controllers, matching Sound Cards, and controller drivers to run all this great high tech gear. Call for Prices.

Colorado Trakker 250 Portable $727
Conner Hornet 250 1"High 3.5" $453
Conner 250mb Parallel Port $805
Iomega Insider 250 1"High $511
Sony DAT 2.0gb SCSI-2 Tape drive - still the best and super quick . $2112
WangTek 500mb QIC-02inc. tape$1173
Sony DC2120 Backup Tapes $40

Miscellaneous Hardware

Honeywell 101 key Tactile Keyboard - The silkiest Typist quality $99
BTC 101 key Tactile Keyboard ... $49
Super I/O Card with 2 x serial, 1 x parallel including the super fast 16650 UART chip - reliable performance to 57,600 bps $59



- All new Honeywell Mouse
- Few moving parts
- Limited lifetime warranty
- True 320 dpi resolution
- You don't need a pad and you never need to clean this mouse - that's a fact
- Mouse design will never be the same again
- You may never need a new mouse

Priced to go at $125

CARDINAL®

Just Arrived From The USA — the Hottest Sound Card System on the US Market.

- True 16 bit stereo with a whopping 48 kHz sampling - Cardinal leaves the others floundering
- Digital Signal Processor Technology
- Meets all industry sound standards including Ad Lib, MPC, Compaq Business Audio,MS Sound System and SoundBlaster
- The Digital Sound Pro 16 includes interface to suit Sony CDU-31A CD ROM
- The Digital Sound Pro 16 Plus also features a 16 bit Adaptec SCSI compatible adapter
- Jumperless software setup, unlike competitors
- Three year warranty
- Now available from PC JUNCTION



Digital Sound Pro 16 ..... $341
Digital Sound Pro 16 Plus $479

Conditions

We accept Bankcard, Visa, Mastercard or cheque. Instant accounts for public companies, schools, Government Departments and Universities. Your card is not charged until we ship. All prices shown include sales tax.
Manufacturer's warranty on all products. Defective hardware repaired or replaced at our discretion. We pay no freight on warranty claims. All products subject to availability. Prices and promotions subject to change without notice.

Shipping

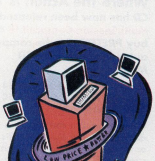
All products despatched by overnight courier for $12. Some large software and hardware packages may be more. We quote at time of purchase. Printers and monitors will be quoted.

Call Now on (02) 415 1991 or Fax on (02) 415 1747

Albert Oz moves north

Ozzie Discount Software introduces first Sydney store

Professor Albert Oz, the marketing face of Ozzie Discount Software, is now appearing in Sydney. The mega-successful computer software reseller has opened its first Sydney store at 40 Park Street, the second foray outside the company's home state of Victoria and another step in a national expansion plan, according to corporate services director, Barry Lipp. It will be the company's seventh store. The sixth, on the Gold Coast, has been operating successfully for several months. The Park Street store will be one of the company's largest, according to its manager, Stuart Tovey.



Opening was initially postponed because of stock delivery delays. "There's no point in opening half heartedly, so we put back the opening date to the middle of October. When we open it will be with a full complement of software, to give customers the most choice," he said.

Ozzie Discount has grown from a two-family business sprung out of a recession environment to a company which has estimated that it will turn over between $15 and $20 million this year. The business operates on a show-and-tell basis. It is fully stocked with PCs on which to demonstrate products and to replicate problems that users may experience with their software.

Ozzie Discount's Sydney store can be contacted on (02) 283 1533.

Harvey Norman superstore opens

A vision of the future for retail computing?

The first Harvey Norman Computer Superstore will open its doors in Sydney this month. The Auburn superstore is the prototype in Harvey Norman's vision for a new way of shopping for a computer.

The store, which covers more than 16,000sq feet in area and houses more than five million dollars in stock offers many new facets, according to Harvey Norman's Frank Robinson. "The Auburn Superstore will open with a full range of Apple computers, something that is new for Harvey Norman. We'll also be stocking the IBM range, from the IBM ValuePoint and PS/2s to the ThinkPads, and a full range of Compaq computers.""

The store will also showcase the first ever software upgrade counter, where customers can simply bring their disks and trade them for the upgrade version, and an academic software counter, at which special prices on software for academic use will apply. The only requirement for software at academic price is that the customer presents a current student card.

The store will also offer onsite service by certified technicians, so that both in and out-of-warranty work can be carried out on the spot.

A certified Novell network engineer will also be on the premises to assist in discussions about implementing a network.

"It's much more than just a cost-effective place to buy a PC," said Robinson. "There are many, many people here able to discuss the customer's needs at all levels of expertise."

PC dealer sends customers packing

On holidays, that is ...

Rural PC dealer Rod Marks is sending customers on courtesy holidays to either Singapore or Northern Australia, just for taking one of his PC deals. He's celebrating an extraordinarily good year in business, and taking advantage of the ability to buy package holidays on the cheap, as a bundle from his software supplier. Anyone who buys an RMC bundle can choose a holiday in either Singapore, Cairns, the Gold Coast or Ayers Rock. The offer applies to every bundle sold, and will last as long as the handful of tickets he has acquired. Not surprisingly, the offer has been well subscribed, but at the time of going to press there were still a "couple of hundred" tickets left.

The deal PC is a 486SX with 2M RAM and 130M hard drive, 1.44M floppy drive, (customers can specify that they would prefer a 1.2M, or for an extra $80 ex-tax can have both), SVGA monitor and 512K card, DOS 6.0 and mouse.

The package also includes herd-management software custom written for the local community, which is primarily dairy farming, as well as rural-oriented accounting and spreadsheet packages, shareware for more generic applications such as word processing, and a Star Micronics 9-pin dot-matrix printer. The ex-tax price for the bundle is $1690, and many primary producers

are eligible to claim this exemption when buying a computer to manage their business.

If not, all the hardware components of the deal are subject to 21 per cent sales tax, bringing the final retail price closer to a little over $2000. Extra RAM may also be required, since 2M is small by current standards, and this is available at $90 per megabyte, ex-tax.

Again, a 21 per cent sales tax may be applicable. All machines are covered by unlimited telephone support, two years parts and five years labour warranty. RMC offers freight-free return to customers in outlying areas whose machines need servicing.

The 'free' holiday relates to the airfare component of the package, and customers pay for their own accommodation. A range of hotels is set for each destination.

One local farmer keen to take up the RMC offer is Jackie Powell, who along with her husband runs a dairy property in Windemere, near Ballarat in Victoria. "We have been looking at buying a computer for about a year now. It seems like a really good deal, especially with the herd-management software, and buying a 486 makes good sense."

Urban cowboys can also take advantage of RMC's deal, by calling (056) 59 6358.

How good a buy are you really getting?

Caveat emptor

When is a bargain not a bargain? And how far can an ad push your credulity before it constitutes misleading advertising? These and other questions arose out of this month's Price Watch, (see page 20) in which *PC Super Market* price-hounds made an interesting foray into what an advertiser really offers when promoting a system, and the real cost of the bits left out.

A notable attempt to make the deal sound more attractive is the exclusion of sales tax, set at 21 per cent for all hardware components of a system, and is calculable on the last wholesale price. Software is exempt from sales tax, making the tax-inclusive price of a total package difficult to calculate. Vendors argue however, that advertising prices ex-tax is legitimate, because of the proportion of customers to whom it applies. Primary producers, manufacturers and people intending to export the PC are among those eligible to claim tax exemption, and full guidelines are provided by the Office of Taxation.

Other 'bargain' offers may be revealed to be PCs with low hard disk capacity or very little RAM. With RAM prices floating at around $90 or $95 per megabyte, a machine which offers 2M RAM for a couple hundred dollars less could end up costing the same, if not more, by the time it's revved up to normal strength.

The biggest trap, however, is those tiny little words at the bottom of the ad which read 'monitor not included'. Just because a PC includes a SVGA card in the box, don't assume the vendor provides a monitor in the advertised price. A prime example of this is the current Compaq television commercial, detailing the range Compaq covers, from high-end servers to entry-level PCs. The claim is that you can have a Compaq on your desk for $2500, leaving the unspoken visual message that a monitor is not included in the deal. Adding a Compaq monitor pushes the price for the advertised system up several hundred dollars, possibly disappointing bargain hunters.

So what can you do if you feel that an ad is unreasonably misrepresentative, or that it didn't reasonably offer enough information to make a valid comparison or informed decision? The Advertising Standards Council exists to arbitrate complaints made about advertisements in all media, whether those complaints are made by consumers or competitors. According to executive director, Colin Harcourt, many of the complaints received by the Council are made by competitors, rather than disgruntled consumers. "When times get tough, vendors are tempted to test the limits of their credibility, and it is at that stage that we get complaints from competitors, alleging false or misleading information, and asserting that the presentation of information in this way offers unfair competitive advantage." When complaints are received, the Council adjudicates, taking into consideration the perspectives of the complainant, the defendant, usually the agencies involved and the publication, and will decide whether or not the advertisement must be modified or withdrawn. Harcourt advises that consumers who feel that an advertisement does not supply enough information, or presents it in a way which is illogical, illegible or misleading, are entitled to make a complaint to the Council.

The Advertising Standards Council can be contacted on (02) 954 9781.

Uniloc to prevent piracy, protect investment

Australian ingenuity may have resolved the devastating problem of piracy. In an industry which reputedly loses $250 million to theft and illegal copying, and at the same time relies fundamentally on users to do the right thing, Uniloc may be the answer to a software developer's prayer.

Australian mastermind, Ric Richardson, has developed a software lock which will tie a piece of software to the machine for which it has been authorised. It is a mature and more lateral approach to the problem of piracy, which has for too long been considered a war, according to Richardson.

"When you look at the reasons for piracy, there are a lot of grey areas. And a lot of the rationale for illegal copying is deficiency in the distribution and delivery system." Uniloc will facilitate the distribution of software through channels other than the conventional reseller and direct, by allowing direct credit-card-based transactions between the software vendor and customer.

The software will also protect a user's investment, since all applications which use the Uniloc system, and users of them, will be registered with Uniloc, so that if a hard disk crash occurs, Uniloc will be able to refurnish the ravaged hard disk with the software it has been authorised to carry.

Initially, however, it seems that there are authorisation problems to be solved. It is legal to own one copy of an application and install it on two machines at once, provided that they are not used concurrently, and are used in line with the generally accepted terms of software licence agreements. Uniloc restricts the use of the application licence to the particular machine prescribed at the time of purchase, requiring even users who intend to do the right thing, to make new arrangements every time they upgrade their machines or add to their hardware investments.

New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

IMPROVED

More brilliance — Philips upgrades monitor range

Philips has released an upgraded autoscan colour monitor, the Brilliance 1720. With refresh rates up to 76Hz in 1280-by-1024 mode which provides a stable, flicker-free display, the Brilliance 1720 is a significant 16Hz greater than its predecessor, the Philips 1710.

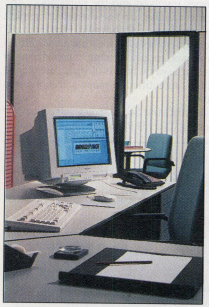
There are a choice of 12 factory and 15 user-definable modes. Choosing any of these modes recalls the corresponding display parameters, including horizontal and vertical scanning rates and image scaling. There is no need for manual adjustment.

The 17in Brilliance 1720 has a dot pitch of 0.27mm and is suitable for graphics and windowing applications running on PCs, Macs, workstations and X-terminals. The monitor costs $2500. For further information contact Clear Technology, (02) 310 3077.

NEW

HP releases monochrome inkjet plotter

Hewlett-Packard has announced the release of a large-format, monochrome inkjet plotter, the DesignJet 200. Available in two models — an A0-size model, which costs $9258 and the $7163 A1-sized model, the DesignJet plots up to five times faster than pen plotters.



The plotter is suitable for individuals or small groups creating engineering, architectural or construction drawings and needing relatively low plot volumes of up to eight plots a day. "This product provides entry into HP's DesignJet family of inkjet plotters for those on tight budgets," Robert Plowman from HP said.

The DesignJet prints with a resolution of 300dpi and features both a final and draft print mode. It comes with Centronics and RS-232 serial ports and is shipped with drivers for AutoCAD ADI and Windows. Contact Hewlett-Packard on 131 347 for further details.

NEW

Presentation software from WordPerfect steals the show

WordPerfect Pacific has announced that WordPerfect Presentations 2.0 for Windows is now available. Combining advanced presentation, charting, drawing, text and painting tools, the software supports TWAIN, OLE (object linking and embedding) and direct CD-ROM sound including support for the Roland Audio Producer card (RAP-10), which allows the combining and editing of digital audio (WAV) and MIDI sound files.

WordPerfect Presentations for Windows retails for $695. Registered users of WordPerfect software will be able to purchase the product for $189 until the end of the year. For more information, contact WordPerfect Pacific on (02) 415 5322.

NEW

World's smallest laser-quality desktop printer

With a footprint of 320 by 360 by 160mm, the Oki OL400e is claimed to be 12 per cent smaller than the smallest HP printer. Using LED technology, the printer features a 32-bit 16MHz RISC microprocessor, 44 built-in fonts, 300dpi resolution and a 100-sheet adjustable universal paper tray. The OL400e prints at up to four pages per minute and is compatible with the HP LaserJet IIP emulation. It offers parallel and serial interfaces with auto-switching. The printhead is warranted for five years.

The OL400e is priced at $1699. However, according to Jeremy de Silva from IPL Datron, "We expect that with dealer incentives and bulk discounts, the actual street price will be considerably lower."

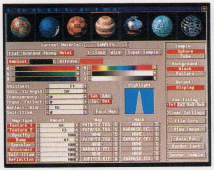


For further details, contact IPL Datron on (02) 698 8211.

IMPROVED

3D Studio Release 3 makes light work of rendering

AutoDesk has announced major upgrades in the release of 3D Studio Release 3. 3D Studio Release 3 is 3D modell-



contact Dataplex on (03) 210 3333.

NEW

Laser printer war — Canon fires back

With a spate of recent product releases in the low-end laser-printer market from rival manufacturers including OKI, Canon has announced the release of two new laser printers, the LBP-4U and the LBP-4i, designed specifically for the small business and the home office. The printers are compact, four-pages-per-minute machines.

The LBP-4U has nine scalable and eight bitmapped resident fonts. It comes with 0.5M of memory, upgradable to 4.5M and uses Canon's proprietary page description language, CaPSL III.

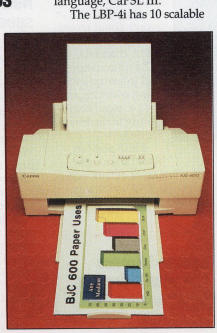


The LBP-4i has 10 scalable and 14 bitmapped fonts. It comes with 1M of memory, upgradable to 5M and uses PCL5. The printers cost $1495 and are available from Canon's authorised dealers. For more details, contact Canon Australia on (02) 805 2000.

NEW

. . . and introduces a new BubbleJet to its arsenal

Canon has introduced the BJC 600, a full CMYK, four-colour process printer using four BubbleJet print heads, one for each colour. The $1695 BJC 600 has two print speeds — high quality (HQ) at 170cps or high speed (HS) at 240cps, and comes with a built-in 100 page sheet feeder. It is specifically designed for A4-sized printing on plain paper but will also print on coated paper, envelopes, overhead transparency film and specially developed 'Back Print' film which allows backlit presentation. Contact Canon Australia on (02) 805 2000 for more details.



NEW

Dataplex appointed distributor for BOS products

Communications company, Dataplex, has been appointed the Australian distributor for the Better Online Solutions (BOS) range of PC to AS/400 connectivity products. The product range includes remote and local gateways and controllers, printer/terminal emulation cards, asynchronous, Token Ring and Ethernet connectivity products and barcode/magnetic strip readers. For further information, ing, rendering and animation software which provides significant improvements to rendering quality and speed among its 200 new features. Among the new features is a network rendering capability which is NetBIOS-independent with up to 9999 nodes being accessed simultaneously to render any number of images.

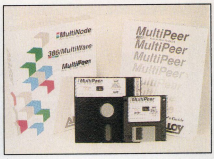
The software runs on 386/486-based computers with 8M of RAM, coprocessor, SuperVGA device, hard disk and a Microsoft or SummaSketch-compatible pointing device. Release 3 will cost $4595, or for those upgrading from Release 1 or 2, $695. Enquiries should be directed to AutoDesk Australia on (03) 429 9888.

IMPROVED

Alloy upgrade peer-to-peer LAN offering

Alloy has announced the latest release of MultiPeer, its peer-to-peer LAN operating system. With enhanced functionality and performance, MultiPeer Version 2 features both a DOS and Windows interface, support for the IPX/SPX protocol, single-step automated installation, electronic mail and a range of security features.

MultiPeer can be purchased as either a software-only licence or in workstation packs, which include the MultiPeer licences and all the needed hardware including Alloy NICs, cables, T-devices and terminators. A two-station workstation pack costs $640. For further information, contact Alloy Computer Products (Australia) on (03) 561 4988.



IMPROVED

Feature-packed fax modem in small package

Microfax, the Australian designed and developed fax and data modem, has been re-released with a host of enhancements including support of the Lexmark 4029 laser printers, a clip-on battery pack, onboard diagnostics and self-test, improved error correction, serial cable and AC power adaptor included at no cost.

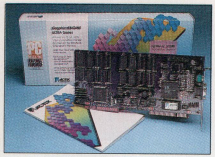
The Microfax is a miniature self-contained fax and data communication system which enables most printers to be used as a plain-paper fax, without the need of an attached computer. It receives and prints fax and data messages directly on the printer and can automatically detect the type of printer to which it is connected.

The Microfax Version 2 costs $495 and is available from Microfax, which can be contacted on (02) 965 7230.

NEW

Actix Systems releases Windows accelerators

A new series of graphics accelerators has been an-



nounced by Actix Systems. The GraphicsENGINE Ultra VL Plus supports multisync monitors with refresh rates as high as 94Hz at 800-by-600 resolution. The Ultra Plus series provides accelerated 24-bit true colour support for resolutions up to 800 by 600 pixels and S3's True Acceleration (as opposed to coprocessed acceleration) for Windows, NT, OS/2, Presentation Manager and SCO Open Desktop.

The GraphicsENGINE Ultra VL Plus series costs $895 and is available from Sprinter Products, which can be contacted on 008 809 136.

IMPROVED

TwinBridge Chinese interface can't go wong

PC Express has announced Version 3.2 of TwinBridge Chinese for Windows. Improvements in the new version include support for PostScript and PCL printers and video, accelerator, display and bus cards.

TwinBridge Chinese places a small input window on the bottom of the screen and allows the user to type in Chinese using a variety of input methods including Pin-Yin, Zhuyin and Canglie, from virtually any Windows application. A font editor for creating new characters and phrase dictionary are included. TwinBridge Chinese sells for $295. A Japanese version is also available.

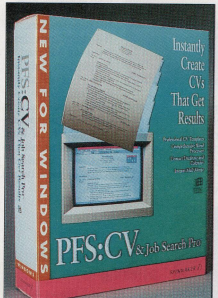
TechFlow has also announced distribution rights for Gamma UniVerse for Windows, a multilingual word processing and font system. UniVerse is supplied wih a font for Arabic, Hebrew, Russian, Greek, Eastern European and English. The package costs $285.

For more information on either package, contact Techflow on (02) 971 4311.

NEW

Hi-tech job search tool addresses growing market

Spinnaker Software has announced PFS:CV & Job Search Pro for Windows, a software application that enables job seekers to create CVs and conduct job searches. The software consists of three modules: a CV Builder featuring automatic layout and formatting facilities; a Job Search Manager that includes an intuitive contact manager and calendar for tracking job search and interview information; and a word processor with spell-checking and action word glossary.



PFS:CV & Job Search Pro for Windows costs $79 and requires a 286 machine or higher capable of running Windows. For further information contact Spinnaker Software on (02) 954 0588.

IMPROVED

Logitech introduces a 'plug-and-play' hand scanner for the masses

Logitech has announced the new ScanMan EasyTouch, a boardless, 256 greyscale, Windows-based handheld scanner which includes Logitech's FotoTouch image editing software and OmniPage Direct AnyFont OCR software form Caera Systems.

The scanner plugs directly into the parallel port of a computer, with a special pass-through adaptor so a printer can operate through the same port. The scanner is targetted at all computer users, but specifically at the portable computing market. According to Greg Neher from Logitech; "Not ever having to open up a computer, use another card slot or worry about technical matters like DMA channels, SCSI termination and interrupts will bring scanning into the personal computing mainstream, we believe."

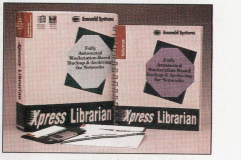
The ScanMan EasyTouch costs $494. For more details, contact Logitech Australia on (02) 360 1098.

IMPROVED

Updated Xpress Librarian's greater functionality

Emerald Systems has begun shipping the latest release of the popular Xpress Librarian network backup and data storage management software.

New features offered by Version 3.0 include support for all Adaptec SCSI interface cards; support for NetWare 4.0; and enhanced support for Microsoft Windows for Workgroups. Xpress Librarian also features a Windows interface, librarian and disk grooming capabilities



and an optional module to enable backup of peer-to-peer hard drives on the network. The software is workstation based.

Xpress Librarian 3.0 is available from Com Tech and will cost $1180. For further information contact Com Tech on (02) 317 3088.

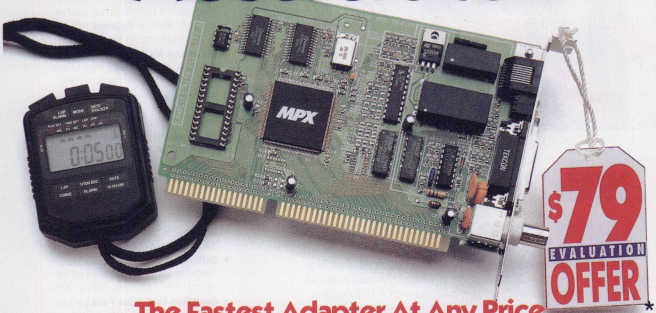
IMPROVED

New Close-Up a real speed-up

Silver Networks Australia has announced the release of Close-Up 5.0 from Norton Lambert. Responding to user requests for a fast, remote-control program for Windows, Close-Up 5.0 is claimed to redraw remote Windows screens up to eight times faster than other remote-control software. For mobile computing users and telecommuting, the software will allow connection to the office and the attraction of running office applications at speed and with full reliability.

Close-Up 5.0 is priced at $325. For further information, contact Silver Networks Australia on (02) 906 6555.

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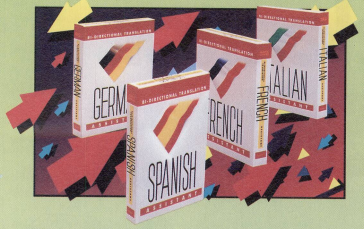
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Start with two PCs and keep adding more as your needs grow.

The Data Link's fast 6,250 cps transmission speed (that's 375,000 characters a minute or 180 average A4 pages of text!) gets your job down the line pretty quickly.

And as for distance, there's no real barrier. You can print up to 1500' (450 metres) away.

A 25' (8m) RJ11 (thin, telephone-style) cable is included for each PC. Installation is as simple as plugging the "transmitter" unit into the printer port of your PC, the "receiver" unit into the printer and connecting them with the cables supplied. There's no way to make a mistake or a wrong connection.

Being parallel, there are no baud rates or parity to set. There is no software to run. No confusion. Just plug it in and start printing.

Use the **Data Link Distance Extender** if you'd like to direct-connect to a parallel printer a long way away, This consists of a Data Link transmitter for your PC, a receiver for your printer and 25' (8m) of cable. If you'd like to go further, we can supply you with inexpensive cable up to 450 metres long.

If a single printer is what you'd like to share ... and you'd like to do it automatically ... there's no quicker, easier or more economical solution than the Data Link system.

Share Wonder lets up to 36 PCs automatically share up to 6 printers with no software. Just dial the printer you want...



Share Wonder lets you share up to 6 printers between 36 PCs simultaneously! That means everyone in your office can get instant access to all your LaserJet, PostScript and dot-matrix printers.

The Share Wonder's modular concept allows you to start with just the the number you need for the PCs and printers you now have and never need to worry about expansion. Just add printer or PC Share Wonder modules as your needs grow. It's really that easy!

That lets everyone share all your printers ... all the time.

You can connect to a printer 300 metres away, through your parallel printer port, at a very fast 10,000 cps and using inexpensive telephone-style cable.

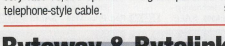
Share Wonder includes a simple 6-way selector to let you "dial" the printer you want, from your desk! Just turn the knob to select your printer. It even has lights to let you know if the printer is busy or out of paper ... to save time.

And installion is a snap, just like connecting a printer. Plug a "transmitter" into the printer port of each PC and a "receiver" into each printer. Then connect them with the cable (8m) supplied for each PC ... and start printing.

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Introducing Buttman a roaming video voyeur who is armed with a video camera and always ready for action. Does he get away with filming these women?

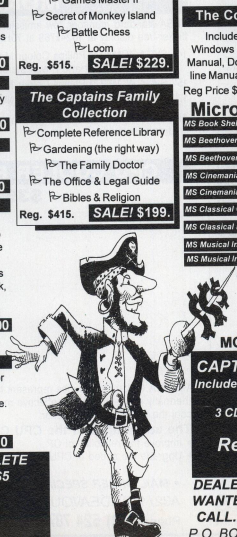
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Ethernet Card 8/16 Bit NE2000 Compatible 10Base-T & -2 (coaxial	**$99.00**
Token Ring Adaptor ISA Bus SMT 16/4 Mbps, 100% IBM compatible	**$595.00**

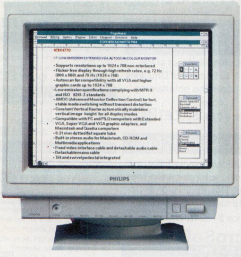
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Ethernet 8 port hubs for 10BaseT	**$550.00**
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Microsoft Ergonomics Mouse (latest OEM model)	**$50.00**
Honeywell Mouse – Patent design with 2 contact points instead of a ball sensor, driver included. (3 year Warranty)	**$75.00**
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MONITORS

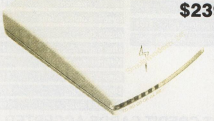
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All PHILIPS products carry 2 years warranty at various PHILIPS service centres nationwide.

Latest model FAX MODEM 9600/2400

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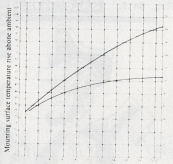
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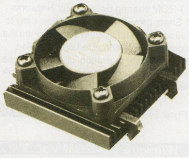
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Bundled with WINFAX LITE software.

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$35.00 ea.

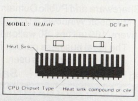




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The advantages of the CPU Cooler

- Improve the reliability of CP
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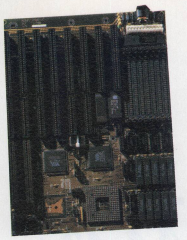
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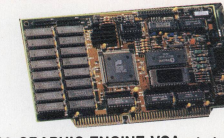


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2 versions • VESA • PCI (PENTIUM)
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- MULTI-LAYER PCB WITH PREMIUM COMPONENTS

PCI PENTIUM

Includes Prodrive zif socket, NCR SCSI II.
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S3 GRAPHIC ENGINE VGA windows accelerator (Award Winning) VGA card

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Max. 2MB onboard RAM, 1280x1024 resolution 16 million colors includes driver for windows, cad, dos etc.

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VESA 486DX-33Mhz Computer System
$3,050.00
VESA 486DX2-66Mhz Computer System
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4Mb RAM/200Mb Hard Drive/ 1.2 FDD/1.44 FDD/KB/MS Mouse **VESA** S3 Window Accelerator VGA/Deluxe Mini TC/motherboard includes prodrive ZIF socket for the CPU, 8 Dupont SIMM Socket for max. 128Mb RAM, 4 layer PCB with 2 VESA & 5 ISA socket, VIA chip set, AMI/AWARD BIOS. Plus 14" NEC SVGA low radiation non-interlaced color monitor (1024 x 768, 65 Mhz video brand width).

Option: CD-ROM upgrade Pro-series w/16 Bit Sound Galaxy Card, Panasonic CD-ROM with double speed and PhotoCD (Multi-session), window CD pack including animals, encyclopedia typing and games etc.

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- **MEMORY upgrade to 128MB**
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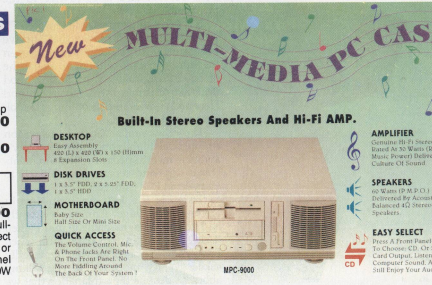
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BLACK (SAMPLE AVAILABLE)

Low cost mini tower/or desktop with 200W power supply $98.00

Multi-Media Computer CASE $295.00
Ideal for multi-media application, including 2 full-range speakers, 10W power amplifier built-in, select between internal (direct from CD audio out) or external audio input (from sound card), front panel headphone and mic input, 3x5.25" slots, 200W power supply.



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Price Watch

When is a bargain not such a bargain? The price on the ad may not be the price for a working system. Our PC Super Market Price Watch team takes a critical look at some current advertising.

It is important to preface this month's Price Watch with the strict clarification that this is a 'how to' guide rather than a 'not to' guide. None of the computers featured here are bad value, unworthy or inappropriate. What Price Watch thought was important, however, was to ask a few questions and challenge a few claims to discover what lay under the advertising veneer, and just as importantly, what was left out.

Additionally, since Price Watch is an anonymous exercise, our price hounds, just like normal customers, can only rely on the knowledge passed on by sales staff and resellers.

All information appears as provided to us, and is reprinted in good faith that it is both correct and does justice to the provider.

It is becoming impossible to watch TV without seeing notebooks that survive being run over by steamrollers, or to open the Sunday papers without an avalanche of advertising material promising good deals at irresistible prices. Caveat emptor! Here are a few examples of things to look out for and question.

The now-familiar Compaq television commercial highlighting the company's ability to meet a spectrum of requirements boasts high-end servers from $15,000 to entry-level PCs from $2500.

'From' is the key, an irritation in anyone's language. Compaq evidently had no particular machine in mind when it chose the figure $2500, because when Price Watch phoned we were repeatedly asked "Which machine are you talking about ?," despite the explanation that we were responding to the TV commercial.

The closest the sales department could get was to offer a machine either without a hard drive or without a monitor — hardly the 'total solution' the industry at large is so fond of promising. Additionally, the system price was tax exclusive, adding another few hundred dollars to the final price.

Ironically, the system, with monitor, hard drive, and including tax, is available at a discounted rate from authorised Compaq resellers.

The award for truth in advertising must go to Dick Smith Electronics' catalogues, for which all the items we checked included sales tax, and were very complete. The only shortcoming in system configuration was on a Commodore 486SX/25 machine which offered Windows as part of the package, but only 2M RAM. Scott, from the North Sydney branch, happily told Price Watch that the extra 2M could be installed and the machine would be home delivered and subject to the usual Dick Smith Computer Easy Customer Care Plan. The plan includes 12 months onsite service warranty, introductory training, VIP Computer Club membership, computer support hotline, and BBS access as well as the installation.

Dell specialises in the 'fine print' method of advertising its computers — the ex-tax price is highlighted in red, and the full price just flows on in the rest of the text. Nevertheless, no-one could accuse the company of attempting to mislead, and the systems offered have very comprehensive feature sets and represent good value for money.

In summary, watch out for low hard drives or insufficient RAM; check that a monitor is included, at least a 14in SVGA colour monitor; make sure that if you need to pay tax, the ad specifies that tax is included; grasp the junk mail firmly in one hand and go shopping!

WYSIWYG computer deals

Claim	Source	Includes	Price
Dell 425S/L	Computer industry magazines	i486SX-25, 4M RAM, 120M HDD, 1 floppy drive, SVGA monitor, Local bus video, DOS 6.0, Windows 3.1, Mouse	$2495
Dell 433/L	Computer industry magazines	i486DX-33MHz, 4M RAM, 120M hard drive, 1 floppy drive, SVGA monitor, Local bus video, DOS 6.0, Windows 3.1, Mouse	$3195
Dell 466/L	Computer industry magazines	i486DX2-66MHz, 4M RAM, 120M hard drive, 1 floppy drive SVGA monitor, Local bus video (including graphics accelerator) DOS 6.0, Windows 3.1, Mouse	$3875
Dick Smith Commodore 486SX/25	Junk mail catalogue	4M RAM, 120M hard drive, 3.5in & 5.25in floppy drives,14in VGA monitor, MS-DOS 5.0, Microsoft Windows 3.1, Works for Windows 2.0, Money for Windows, Mouse, OKI printer, Printer lead, Computer desk	$2799
Dick Smith IBM 486SX/33	Junk mail catalogue	4M RAM, 3.5in & 5.25in floppy drives, 129M hard drive, 1M video RAM, .28 dot-pitch SVGA monitor, Cache 256K, Internal cache 8K, Mouse, MS-DOS 6.0, Microsoft Windows 3.1, Works for Windows 2.0, Power-saving 'Sleep' mode with Autosave, Large case for future expansion, 145-watt power supply	$2999
Dick Smith IBM 486DX/33	Junk mail catalogue	4M RAM, 3.5in & 5.25in floppy drives, 170M hard drive, 1M video RAM, .28 dot-pitch SVGA monitor, Cache 256K, Internal cache 8K, Mouse, MS-DOS 6.0, Microsoft Windows 3.1, Works for Windows 2.0, Power-saving 'Sleep' mode with Autosave, Large case for future expansion, 145-watt power supply	$3599

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By Olivetti
Scratch Resistant Surface
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Made in Europe
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NEW!
from Basic Philos 11 $2395
With 386SL-25, 2Mb Ram, 60Mb H/D

OLIVETTI QUADERNO 33
1/2 A4 Size 1550g, Windows 3.1 Computer!
386SX-20, 4Mb Ram, 60Mb H/D, Voice Recording 6 Hr Battery c/ Trackball
$3495

FINAL SOFTWARE CLEARANCE
Mostly Ex-Computerland & Ex-WiSoft Stock
Some may be subject to upgrade/trade-up conditions
* Lotus 1-2-3 for Dos or Win $380
* WordPerfect for Dos or Win $380
* MS - Office $650
* MS - Excel / Word $380
* Paradox $750
* Visual C / Basic $500

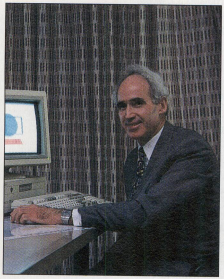
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SAVE!
LATEST EQUIPMENT AND BEST PRICES
Short or Long Term Rentals
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SPECIALS | HARDWARE | SOFTWARE | ADVICE | SERVICES

COMPANY PROFILE

CompuServe

BY HELEN DANCER



CompuServe offers the world, online.

Expensive? Complicated? Cliqueridden? All these are criticisms that have been levelled at CompuServe since its inception. CompuServe Pacific manager, Stuart Broad, is an ardent fan, not only of the service, but of the membership. "Not so long ago I uncovered a forum of helpful advice on how to access and maximise the use of CompuServe. Some members tap in to learn, and others to contribute their experiences. It's a wonderful resource that was instigated completely independent of our organisation." It means, he asserts, that the service is becoming a vehicle for sharing, not just retrieving information, and is more friendly than its reputation allows.

Access to information is, however, the prime focus of the service, which was established in Australia in 1991 when Fujitsu obtained the licence to administer CompuServe in Australia and New Zealand.

Subscribers can access a wide variety of information, from news, product support and 'electronic mail' home shopping to information on new product directions and more recently, access to Tenderlink — an online tendering and con- tracting facility that opens up overseas business opportunities to Australian companies.

But 'is it a danger to the Mastercard?' is the question that *PC Super Market* pressed Mr Broad to answer.

It is difficult to reduce the complex cost structure to a simple answer, and as usual, the amount it costs depends on the time spent connected. Certainly, those who chose to learn slowly online, may end up spending considerably more than they had planned.

CompuServe charges as follows — naturally enough, users pay the phone bill for the time they are connected to the service. Additionally there's a monthly service charge of $14. The next part is the downfall of the unwary. There are two levels of access; the Basic services, for which access is charged at 25 cents per minute, and the Extended services, which are charged at 45 cents per minute when connected at 2400bps, or 65 cents per minute at 9600bps. Basic services include electronic mail, a function of CompuServe which Broad estimates is used by almost all subscribers.

Very high bills can be avoided, says Broad, by careful management of the time spent online, and the use of the introductory credit offered to new members. "We waive the first month's membership fee, and offer 80 minutes of credit to help new users acclimatise to the CompuServe environment without it costing them more than they had budgeted. Of course, that leaves us open to misinterpretation because naively or otherwise, some people have objected to being charged for the time they spend online. It's the membership fee we waive, not the entire cost of time spent using the service." Spending time online composing an email message is, naturally, a wasteful and costly exercise; composing the message and then connecting achieves the same result at a fraction of the cost.

The argument is akin to Telecom providing a telephone, but not being expected to pick up the cost of making long-distance calls as well. But Broad concedes that the cost structure is sufficiently complex to cause some misunderstanding. "Ultimately there are institutions, such as the Trade Practices Commission, which would land heavily on us if we were deemed to be misrepresenting the nature of our cost structure. We have had complaints, but they are usually based on new users not having read the documentation fully."

Once a user is familiar with the broad range of services at their fingertips, and the temptation to explore further becomes irresistible, CompuServe recommends the use of a navigation program, such as TAPCIS or OZCIS. Either of these programs will facilitate the search and retrieval of defined information from huge databases, ensuring that subscribers don't spend long periods of time online searching for something they may not even be sure exists. "We have had really good feedback on both navigation programmes, with users saying that their accounts for complex searches have been cut in half," said Broad. The navigation facility works by searching and returning a list, allowing subscribers to then decide which of the found documents will be most useful, before reconnecting to download those documents from the system.

Fujitsu's involvement in CompuServe was born out of a similar relationship with Fujitsu in Japan. There the service is called NiftyServe, and is widely subscribed. Five hundred thousand of the estimated 1.3 million people worldwide who are CompuServe subscribers belong to the Japanese service. While the nature of information in demand is not substantially different, the lower cost structure (10 yen per minute, roughly 12 cents) attracts a different range of usage than is characteristic in either the Pacific region or the US. "There are many more home users of the Nifty service than we have here, although there's a very fine line between what is business and what is home usage," he said. "We have a significant number of subscribers who use CompuServe at the office during the day and then go home and dial-up again. How do you decide which category these people fit into?"

Information about CompuServe can be obtained toll free on 008 025 240.

Don't judge a computer by its looks.

It's the components inside that matter.



So, you are buying a new computer, or perhaps you are upgrading your current one. There are a few ways to go about it. You can buy a brand name that you know and pay the price for it, or you can buy a cheap one. And that's exactly what you will get - a cheap computer.

There is, however, a **sensible** alternative. Take a look at AVO Computers. AVO uses only world class components, fully imported Japanese made floppy disk drives, assembled by our highly trained Engineers and burn-in tested for more than three days before they even get to you.

Our prices are highly competitive and our service is second to none in Australia. Service and maintenance has FAST turn-around time either on-site or in return-to-base situations.

It's about time for you to take a look at what you can get for your money! But don't take our word for it, call and ask us for some references from our corporate clients which include some of the top 100 companies in Australia.

These are some of our systems:

386 SX/33 2MB RAM, 85MB HDD 14" SVGA Colour Monitor **$1,400.00**	486 DX/33, VESA Local BUS 4MB RAM, 130MB HDD SAMSUNG 14" SVGA Mon. **$2,380.00**	PEARL 486SX NoteBook 4MB RAM, 120MB HDD Supertwist LCD Screen **$2,675.00**
386 DX/40 4MB RAM, 130MB HDD 14" SVGA Colour Monitor **$1,650.00**	486 DX/50, VESA LocalBUS 8MB RAM, 210MB HDD SONY 14" SVGA Monitor **$3,680.00**	PEARL 486DX NoteBook 4MB RAM, 120MB HDD COLOUR LCD Screen **$4,600.00**
486 DLC/33 4MB RAM, 130MB HDD 14" SVGA Colour Monitor **$1,750.00**	486 DX/2 66, VESA LB 8MB RAM, 340MB HDD NEC Multisync 17" Monitor **$5,340.00**	NEC Ultralite VERSA NB 4MB RAM, 120MB HDD Active Matrix Colour **$6,700.00**

AVO Electronic Systems Pty Ltd
188 - 192 Pacific Highway
(Cnr Bellevue Ave)
ST LEONARDS NSW 2065
TEL: (02) 906 2655
FAX: (02) 906 2735

AVO Computers (North Sydney)
99 Mount Street
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NORTH SYDNEY NSW 2060
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To protect our readers, we back all adverts appearing in *PC Super Market* with our 'Buyer's Protection Scheme'. The Scheme offers two great benefits:

1. The Payment Protection Plan — Where a supplier goes into liquidation after receiving your order and full payment, but before actually supplying the goods, we will reimburse to you the amount you have paid to the supplier in respect of that particular order; provided your order has been registered with us.

2. The Problem Clinic — If you encounter any problem with a product purchased through the Scheme within 12 months of the product order being registered with us (see below), and the supplier won't put things right, we will liaise with the supplier on your behalf to try to sort the problem out. This benefit is non-transferable and applies to the original registered purchaser only.

The Scheme applies to all orders placed with suppliers in direct response to an advertisement in *PC Super Market*. To register a purchase with the Scheme, simply order goods from the supplier in the normal way and then complete the *PC Super Market* Registration Form on Page 25. Give your personal details along with details of the purchase you wish to register. Post the form along with a self-addressed stamped envelope to us within seven days of ordering. The Scheme only protects orders placed within the cover month in which the advertisement for the specific product appeared (for example, the valid period for the November issue is until November 30).

What protection do you get?

The Payment Protection Plan

ACP Publishing Pty Ltd limits its responsibility under the Payment Protection Plan to:
(a) a maximum of $10,000 total payments to a registered party in respect of each advertiser;
(b) an aggregate maximum of $100,000 total payments in respect of all claims by a registered party during any year commencing July 1.

The Problem Clinic

If you encounter problems with a product, within 12 months of registration with us, we ask that you first give the supplier the opportunity to put things right. If you fail to get satisfaction from the supplier, the Problem Clinic will liaise with the supplier to try and resolve your problem. We cannot, however, give product support relevant to specific products. If you need assistance with a delivery problem, before contacting us please allow 28 days from the date on which you place your order to allow advertisers to cope with fluctuations in demand.

Claiming under the Scheme

(i) Before providing the benefits of the Scheme, we will require proof of full payment by you to the supplier.
(ii) Payment under the Payment Protection Plan will only be made after other liable parties (such as insurance and credit card companies) have met their liability to you in full.
(iii) Claims under the Payment Protection Plan must be made in writing in the prescribed form (available on request). Claims will only be met where the appropriate claims form is lodged with us within 30 days of the liquidation of the supplier. Claims forms must be sent or delivered to GPO Box 37, Sydney NSW 2001.
(iv) Payment under the Payment Protection Plan will not be made if the claimant is found to have an association or relationship with the advertiser or its directors who are the subject of the claim.

Ambit of the Scheme

PC Super Market's Buyers Protection Scheme is available only to parties resident or carrying on business in Australia.

Recovery by ACP Publishing Pty Ltd

ACP Publishing Pty Ltd reserves the right to seek recovery from a liquidated supplier of any sums paid to you under the Payment Protection Plan. All we ask is that you give us your full co-operation, including executing any formal documentation required.

Before Buying

1 Use the *PC Super Market* Buyer's Template on page 27 when ordering. This will ensure that both you and the supplier have all the information needed.

To Register

1 Fill out the *PC Super Market* Buyer's Protection Screen Registration Form on page 25. Make sure to fill out all details including the page the advertisement appeared.

2 Mail the completed Registration Form to *PC Super Market* together with a self-addressed envelope.

3 On receipt of your Registration Form we will issue you a reference number for that purchase. This will be mailed to you. You should keep this on file and be ready to quote it in case of enquiry.

Conditions

1 The order must be placed in direct response to an advertisement in *PC Super Market* only (i.e not from brochures or other promotional material sent in response to an enquiry). The order must be placed not later than the end of the cover month in which the advertisement appeared (for example, before November 30 for this issue).

2 Details of the order must be registered using the *PC Super Market* Buyer's Protection Scheme Registration Form on Page 25 not later than seven days after the order has been placed with the advertiser.

3 The Buyer's Protection Scheme applies only to *PC Super Market* advertisements. Advertisements appearing in other areas of *Australian Personal Computer* are not covered.

PC Super Market

In order to register your purchase under the Buyer's Protection Scheme, you must complete this coupon and return it to us no later than the end of the month of publication and also not later than 7 days after the placement of the order (ie: all coupons must be post-marked prior to November 30, 1993 for this issue).

BUYER'S PROTECTION SCHEME REGISTRATION FORM

SUPPLIER DETAILS

Name _____
Company _____
Address _____
_____
_____
Postcode _____
Telephone _____
Fax _____

CUSTOMER DETAILS

Order Date _____

Name _____
Company _____
Address _____
_____
_____
Postcode _____
Telephone _____
Fax _____

These items were bought from an advertisement appearing in PC Super Market on page _____ of issue _____

Quantity	Detailed description of the items (for software include version number)	Unit cost	Total price

DELIVERY DETAILS

Method of delivery _____
Date of despatch _____ Date of delivery _____
Delivery address _____
_____
_____
Postcode _____

SUB TOTAL	
DELIVERY	
PACKAGING	
SALES TAX	
GRAND TOTAL	

METHOD OF PAYMENT

Purchase Order · Cheque · Postal Order · Credit Card (Delete as applicable).

Credit card company _____ Credit card number [| | | | | | | | | | | | | | | |]
Expiry date _____ Signature _____

FOR ACP PUBLISHING PTY LTD USE ONLY

Please don't forget to send this coupon together with a self addressed envelope to:

PC Super Market
ACP Publishing Pty Ltd,
GPO Box 37
Sydney NSW 2001.

REPLY PC Super Market acknowledges receipt of your Buyer's Protection registration card.
We have allocated the reference number [ ] to your purchase.

Please quote this reference number in all future correspondence.
Thank you for buying through PC Super Market.

Please note you will be required to produce this coupon as proof of registration.
Please keep it in a safe place.

PC Super Market

NOVEMBER 1993

The PC Super Market Buyer's Advisory Service offers an independent guide to selecting PC hardware and software. Based on your needs, and drawing on a database of all available PC products, you will receive personalised, written advice on what sort of hardware and software to buy within 48 hours of receipt of this questionnaire. The service costs $25, and some advertisers may deduct that from the price of their goods.

Please indicate the tasks you need or would like to use your computer for.

Word processing YES NO
Use your computer to create letters and other documents. A word processor can also function as a simple database.

Financial calculation YES NO
The spreadsheet is a powerful tool in answering 'what if' questions. Spreadsheets can also help budget and plan finances.

Record keeping YES NO
Databases help keep track of information. Their power lies in their indexing capabilities.

Book keeping YES NO
Computerised accounts clear the paper mountain and make light work of small business management.

tainment YES NO
s, games, games, for the whole family.

ıtion YES NO
tional software can complement school and is more g than textbooks.

amming YES NO
ng to program is challenging and can be rewarding.

Graphics YES NO
Become an electronic artist. The computer can produce marvellous effects, but you'll probably want a printer.

Computer aided design YES NO
The computer can be a valuable aid in drawing plans, designing products and creating line drawings.

Music YES NO
The computer can control a range of instruments, as well as automating manual composing.

Desktop publishing and presentation YES NO
The next step beyond word processing, where text meets pictures. DTP can also be used for business graphics.

Communications YES NO
With a modem, your computer can communicate to other computers, and download programs.

Have you ever used or owned a computer before? YES NO

If yes, please describe your experience

.....

.....

.....

Do you want to run several tasks at once? YES NO
Normally you would load programs as you need them.

What is the maximum you can afford to spend? $ .....

Do you want that amount to include software? YES NO

Do you want that amount to include peripherals? YES NO

Would you prefer a 'name' brand? YES NO

Would you prefer an Australian-made computer? YES NO

Is portability an important factor? YES NO

Will this computer be part of a network? YES NO

If not, will you share information with other users? YES NO

Any other information you would like considered.

.....

.....

.....

.....

Mr/Mrs/Ms .....

Address .....

.....

Suburb ..... State .. Postcode .....

I agree that your advise is given without legal liability for any consequences arising therefrom.

_____
(signature)

Send your completed form to *PC Super Market* Buyer's Advisory Service, PO Box 37, Sydney 2001 with a cheque for $25 made payable to Point Partners.

PC Super Market

Make ordering computer equipment and software easier and safer by using the specially designed *PC Super Market* Buyer's Template. Simply fill in the details of your system and the goods you intend to purchase. Send the form to the supplier to get written confirmation of availability, pricing, compatibility with your PC system, delivery and returns arrangements. Don't forget to register your purchase under the ACP Publishing Pty Ltd Buyer's Protection Scheme. (See page 25)

BUYER'S PROTECTION SCHEME REGISTRATION FORM

SUPPLIER DETAILS

Name _____
Company _____
Address _____
_____
_____
_____
_____
Postcode _____
Telephone _____
Fax _____

CUSTOMER DETAILS

Name _____
Company _____
Address _____
_____
_____
_____
_____
Postcode _____
Telephone _____
Fax _____

ORDER DETAILS

New order _____
Telephone confirmation _____
Mailed _____
Faxed _____
Name of salesperson _____
Date of order _____
Order number _____

Quantity	Detailed description of the items	Unit cost	Total price

SUB TOTAL	
DELIVERY	
PACKAGING	
SALES TAX	
GRAND TOTAL	

DELIVERY DETAILS

Method of delivery _____
Date of despatch _____ Date of delivery _____
Delivery address _____
_____
_____
_____ Postcode _____

SYSTEM COMPATIBILITY

My current system consists of the following:
Hardware _____
_____
Software _____
_____
Peripherals _____
_____
Please state details of your return policy, money back and warranty arrangements:
_____
_____
We confirm that the item(s) ordered is (are) compatible with the customer's current systems described above.

Supplier's signature _____

METHOD OF PAYMENT

Purchase Order • Cheque • Postal Order • Credit Card (Delete as applicable).

Credit card company _____
Credit card number _____
Expiry date _____
Signature _____

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BEST PRICES ANYWHERE !!!

Business Graphics

Applause II	$ 560
Harvard Graphics V2.0 for Windows	$ 195
Lotus Freelance for Windows	$ 520
Aldus Persuasion	$ 510
Microsoft Powerpoint	$ 530
WordPerfect Presentations	$ 420
ABC Flowcharter	$ 480
Micrografx Works	$ 199
Micrografx Org Chart	$ 145

Graphics

Instant Artist for Windows	$ 175
CorelDraw V3.0	$ 245
CorelDraw V4.0	$ 585
Micrografx Designer V4.0	$ 585
Mcrografx Picture Publisher	$ 585

Database Software

Lotus Approach for Windows	$ 165
MS Access V1.1	$ 485
Paradox for Windows 4.5	$ 240
Claris Filemaker Pro	$ 390
dBase IV	$ 825
DataEase Express for Windows	$ 515
Clipper 5.2 (Limited Stock)	$ 390
Clipper Tools (Limited Stock)	$ 290
dBFast (Limited Stock)	$ 300

Spreadsheets

Lotus Improv	$ 159
Lotus 1-2-3 V4 for Windows	$ 495
Microsoft Excel for Windows (New)	Call
Quattro Pro for Windows V5.0	$ 190

Word Processors

Lotus Ami Pro	$ 520
MS Word for Windows	$ 400
WordPerfect V6.0 for DOS	$ 420
WordPerfect 5.2 for Windows	$ 400

Integrated Software

Lotus Smartsuite	$ 779
Microsoft Office (New Version)	$ 735
Microsoft Office Professional (New Version)	$ 850
Borland Office	$ 640

Accounting Software

EASY POWER introductory offer	$ 495
MYOB	$ 370
Best Books	$ 170
Quicken for Windows	$ 59
Quicken for DOS	$ 89
Quickbooks	$ 180

Other Software

Generic CADD V6.1	$ 550
Autodesk Home Design Series + 1 Free Module	$ 86
Autosketch for Windows	$ 245
CA Superproject for Windows	$ 175
ISYS V3.0 text retrieval	$ 425
MS DOS V6.0	$ 89
MS Windows 3.1	$ 149
ACT for Windows	$ 415
Tracker for Windows	$ 585
Typequick V7.0 for Windows	$ 89
Borland C++ 3.11 with App. Frameworks	$ 865
Objectvision 2.1 for Windows	$ 178
Turbo C++ for Windows	$ 255
Turbo Pascal 7.0	$ 205
MS C++ Compiler	$ 570
MS Visual Basic	$ 238
MS Sound System for Windows	$ 365

Utilities

Check it Pro	$ 269
Carbon Copy for Windows	$ 245
CrossTalk for Windows	$ 185
FastLinx for Windows & DOS	$ 140
QEMM 386 V7	$ 105
XTree for Windows V2.0	$ 105
XTree Gold V3.0 for DOS	$ 172
Norton Utilities	$ 155
Norton Desktop	$ 155
Stacker V3.1	$ 150
UltraFax for Windows	$ 150
WinFax Pro	$ 190
PC Tools for Windows	$ 210
Laplink V5	$ 185
Central Point AntiVirus	$ 145
Virus Buster	$ 105
Microsoft True Type Fonts	$ 95
Microsoft Screen Savers	$ 45

Networking & Communications

Intel EtherXpress 16 bit adapter	$ 204
MS Windows for Workgroups starter kit	$ 730
MS Windows for Workgroups with adaptor	$ 405
MS Windows for Workgroups, mail, schedular	$ 810
MS Windows for Workgroups 5 user pack	$ 510
Novell NE 2000 adapter	Call
Novell NE 3200 adapter	Call
Novell 3.11 5 users	$ 1150
Novell 3.11 10 users	$ 2595
XPost E-mail with MHS	Call
XPost E-mail for LANtastic	Call
Lantec Xmenu - menu systems for Novell	Call

CD-ROM - Software

MS Bookshelf	$ 222
MS Beethoven 9th	$ 95
MS Classical cartoons	$ 55
MS Musical sounds	$ 55
MS Cinemania	$ 95
MS Classical Hollywood	$ 55
MS Encarta	$ 460
MS Dinosaurs	$ 95

** Call for all titles and fax or mail list **

Education Software Titles

Paradox V4.0 for DOS	$ 95
Paradox for Windows	$ 100
dBase IV	$ 280
Filemaker Pro for Windows	$ 205
Lotus 1-2-3 V3.4 for DOS	$ 190
Lotus 1-2-3 V4 for Windows	$ 165

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Quattro Pro for Windows	$ 100
Lotus Improv	$ 155
PageMaker V5.0	$ 895
Aldus Intellidraw	$ 195
Aldus Freehand	$ 328
MS Word	$ 165
MS Excel	$ 210
MS Encarta	$ 260
MS Publisher	$ 120
MS C/C++ Education	$ 230

** Special conditions apply **

Upgrades & Crossgrades
Call us for upgrade & crossgrade options



Printers

HP Deskjet 500	$ 630
HP Laserjet 4L	$ 1245
HP Laserjet 4	$ 2855
HP Laserjet 4M	$ 3875
HP Laserjet 4SI	$ 6055
Epson EPL 5200 6 ppm Laser	$ 1345
Epson EPL 8000 10 ppm Laser	$ 2786
Sharp JX 9600 Laser Printer	$ 1945
Sharp JX 9600PS Laser Printer	$ 2710
Texas Instruments Microlaser PS/17	$ 2550
Texas Instruments Microlaser Plus	$ 1875

Scanners

AVR 8800 800 DPI Flatbed 16.8 million colour scanner with SCSI interface card	$ 2560
AVR 8000 GSX 800 DPI grey scale flatbed scanner with SCSI interface card	$ 2150
Epson GT 6500 grey scale flatbed scanner	$ 1850
Epson GT 8000 400 dpi colour flatbed scanner	$ 2322
HP Scanjet II C colour scanner	$ 2450
HP Scanjet II P grey scale scanner	$ 1515
Logitech Scanman 32 with Omnipage direct	$ 265
Logitech Scanman 256 with Omnipage direct	$ 365
Logitech Colour Scanman with Omnipage direct	$ 875

Tape Backup Units

Colorado Jumbo 120 MB internal	$ 225
Colorado Jumbo 250 MB internal	$ 365
Colorado Trakker 250 MB p/port backup	$ 700
IOMEGA 250 MB insider	$ 490
IOMEGA 250 MB parallel port backup	$ 975
Mountain 250 MB internal	$ 498

Modems & Fax

Netcomm Auto Fax/Modem 24	$ 305
Netcomm Pocket Fax/Modem	$ 310
Netcomm M7F	Call
Spirit II 14,400 FaxModem	$ 585
Spirit II Pocket FaxModem	$ 680
Intel Net Satisfaxtion card	$ 900
US Robotics Sportster 14,400 fax & data	$ 590

Graphics Adaptors

Diamond Speedstar Pro	$ 260
Diamond Stealth 24	$ 370
Diamond Stealth 24 Pro	$ 730
Tseng Labs Mega EVA/2S	$ 230
Tseng Labs Mega EVA/1024S	$ 245
Tseng Labs ET-4000 W32	$ 305
Eagle GFX6 graphics adaptor	$ 270

** Call for specification sheets *

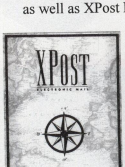
Multimedia Kits

Fusion CD-16 MM Kit	$ 790
MediaVision Double Fusion Kit	$ 1175
MediaVision Pro 16 System	$ 1695
Creative Labs Kits	Call
Sound Blaster 16 ASP	$ 420
Pro Audio Spectrum 16	$ 345
Pro Audio Studio 16	$ 405
NEC CDR 55	$ 625
NEC CDR 84-1	$ 990

* Please call for a multimedia list and specification sheets *

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XPost is available for NetWare 2.X, 3.11, and 4.X, as well as XPost M for peer-to-peer networks.



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80 George Street, Redfern NSW 2016. **FAX 02 699 2949**

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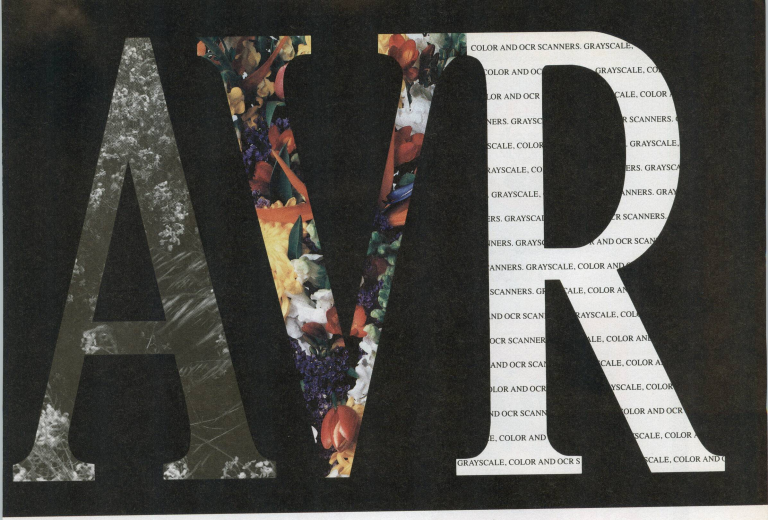
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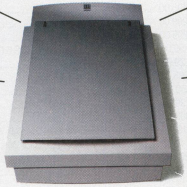
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Scan any size transparency using the optional **transparency adaptor.** A **100 pages document feeder** is available.

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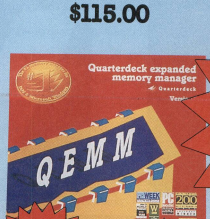
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Arts & Letters Picture Wizard	99.00
Austax Windows	29.95
Autosketch Windows	265.00
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Fastpak Mail	119.00
Generic 3D Drafting	299.00
Gourmet Rapide 3.0	79.00
Home Auto Care & Maintainance	19.95
Infoselect 2.0	299.00
Instant Artist DOS	99.00
Instant Artist Windows	99.00
Key Form Design Plus for DOS	69.95
Key Draw Plus DOS/Windows	99.00
Key Canendar Plus Win	59.95
Key Draw Plus Windows	99.00
Lotus Improve Win	165.00
Managing Your Money 8.0	59.95
More Fonts 3.0	199.00
My Software's Greatest Hits	59.95
Norton Backup	149.00
Norton Desktop Windows 2.2	195.00
Pacilli 2000 Accounting Ver 2.0	249.00
Printcache 3.1 DOS/ Windows	99.95
Publishers Paradise	169.00
Publishers Paradise Lite	79.95
Soft Karaoke Win	69.95
Stacker 3.1 Upgrade for DOS 6.0	89.00
Starwars Sound Win	59.95
Success Sales & Marketing	149.00
Superbase 4 Windows	499.00
Superstor Pro	159.00
Superstor 2.0	99.00
Superstor Pro/Winfax Crosstalk Win	369.00
Terminator 2 Audio Clips for Windows	59.95
Typequick for Windows 5.2	79.00
Type Tutor 5.0	69.95
Vet Andti-Viral Program	85.00
Vistamorph	89.00
Wordperfect 6.0	425.00
Wordperfect 6.0 Upgrade	185.00

CD-ROM

A Line in the Sand CD	69.95
Brian Drain CD	79.95
CD Games Pack II	179.95
CD Speedway	119.00
Conan the Cimmerian CD	89.95
Curse of Enchantia	59.95
Cybergenic Ranger CD	69.95
Dune CD	129.95
European Racers CD	89.95
Hot News CD	59.95
Inca CD	89.95
Indiana Jones IV CD of Atlantis	89.95
Jutland CD	15.00
King's Quest VI CD	99.95
Laura Bow II Dagger of Amon Ra CD	89.95
Legend of Karandia	99.95
Phoenix CD 3.0 Shareware	39.95
Phone Disc	74.95
Publishers Paradise CD Rom	99.95
Q & A 4.0 CD	99.00
Ringworld CD	79.95
Secret Monkey Island CD	109.95
Shareware Express CD	59.95
Sherlock Holmes Consult Detective ITN + Phoenix CD 1	115.00
Sherlock Holmes Consult Detective VCN II CD	89.95
Ultima Underworld I & II CD	129.95
VGA Spectrum CD	29.95
Wacky Funsters CD	49.95
Who Killed Sam Rup CD	59.95
Wing Commander & Missions & II CD	129.95
Space Quest IV CD	99.95

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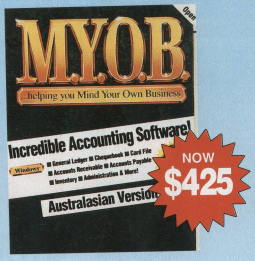
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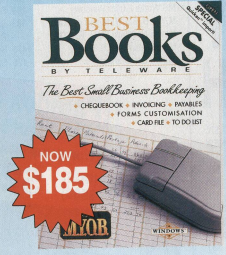
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- NSW (Now Open) 40 PARK ST. SYDNEY PH: (02) 283 1533 FAX: (02) 267 2760
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- GEELONG BAY CITY PLAZA PH: (052) 231 484 FAX: (052) 231 270
- GOLD COAST PACIFIC FAIR PH: (075) 724 200 FAX: (075) 722 150
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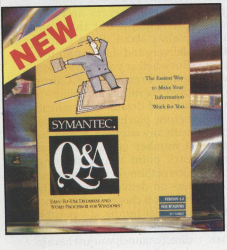
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CITY SOFTWARE

Complete guide to buying direct

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Edited by – Margaret Coffey, Jeremy Torr and Richard Sharpe

Arrival time

Buyers who regularly purchase computer equipment direct normally enjoy fast, efficient service every time. But every so often a direct sale will be held up somewhere between the seller's warehouse and the mail post box. Some delays and mistakes are unavoidable, but many delays can be avoided by ordering in the right way and taking the right precautions.

The three main issues that influence delivery are the method of payment, dispatch timing, delivery time and cost. Make sure you know the company policy on purchasing and delivery practice offered by the seller.

The way you pay is not usually up for negotiation. Unless you are buying on behalf of a local authority, government organisation, school or as a regular large-order customer, the dealer will require the order to be paid for in advance. This will be by credit card or cheque, both of which have to be cleared, or by COD. Whatever the method, only when the transaction is complete will your order start out on its journey to you, and this is generally when the quoted delivery time starts.

Credit-card purchases are usually the best for quick delivery and customer protection. Cheque payment takes longer as most suppliers will wait between three and seven days for a cheque to clear. Once you have checked the available methods of payment, you should look at the way the company delivers. Same-day delivery is relatively rare, but promises of next-day delivery appear regularly.

Delivery service

The delivery offered by direct vendors differs wildly, depending on the size of company, stock of inventory, and how keenly it prices the products.

One company delivering from stock may offer delivery for $8, but give no written time guarantee in its advert. Another will offer a $20 next-day delivery after payment has been cleared. Next-day courier delivery generally runs at around $20. There is sometimes a number of choices given, such as $10 for postal delivery and $20 for next-day delivery by courier, with different delivery rates for different equipment. You may be quoted more for delivery of PCs and/or printers, but less (or sometimes nothing) for peripherals and software.

Another factor that can affect delivery times is whether machines are being delivered from stock or built to order. Any variation is likely to increase delivery time slightly. In this case, always take the naive course: ask questions, double check; don't assume an answer. Protect your order by asking: "What happens if I don't get my order within three days?" And make sure you have a name and contact number for technical backup or management, rather than just for sales.

If you can, get details of the carrier company being used. This means you can check the progress of your consignment if you have the order number and who to ring.

If delivery date is very important to you, insert a time clause into the contract which is made when you order the goods. If the order is made over the telephone, follow it up with a letter or fax asking for a response to the time clause.

Direct buyers and suppliers point out that complaints about direct channel delivery and shipping are few. But whether you're in Wollongong, Fremantle or Cairns, there are still basic questions to ask and details to investigate before placing a firm order with any supplier. Sound out a number of companies on each point before ordering. One of the most influential factors on delivery time will be how you choose to pay. Once past that hurdle, it's possible to find great service in the direct channel; you just have to do your homework first.

How to judge a warranty

There are times when customers open boxes, only to find a monitor is dented, or a computer is dead on arrival. Most companies operate a return-if-faulty policy, or offer a warranty which ensures onsite help from technicians. Before ordering, make sure you don't have to return the whole machine if individual parts need to be replaced. Or if you do, it is not at your expense.

Virtually every computer system comes with some sort of warranty, either written or implied. But not all warranties offer the same level of cover, and you would be well-advised to find the exact warranty details before you part with your money. Waiting until you need it might be too late.

If you look at the included guarantee, working out what is and isn't guaranteed is usually pretty straightforward. Advertising copy, or indeed any text which spells out the goods' claims on paper, is also classed as an implied warranty. Likewise, unwritten guarantees such as the salesperson's word are also binding. This guarantees that all buyers, whether they have a written warranty or not, have the right to a perfectly working product for a set period of time. This time period is normally taken to be the same as the written warranty (if one exists) or else the industry norm for a particular type of product, which in the case of PCs would usually be one year.

Implied terms are those so obvious they don't need expressing and are mostly contained in the Consumer Rights legislation enforced by your particular state. If a supplier is not keen to supply a written warranty, be extremely cautious. Find out exactly what cover is implied and if it comes within the normal consumer law legislation.

Vendor warranties

If you need to fall back on a warranty, your first port of call is whoever you purchased your goods from. The act of purchase forms a contractual relationship. It makes no difference whether you bought with cash or on credit, sale or full price, for yourself or on behalf of your company. If you have bought directly from a manufacturer then that is where the responsibility lies. If you bought from a dealer your guarantee comes from them. You can fall back on the maker's guarantee if you need to, but the immediate responsibility lies with the dealer — even if they pass it back to the manufacturer or its agent.

If you are lucky, the warranty will be what is known as unlimited, although this can still be for a set time period. Not only will the company repair or replace a malfunctioning, damaged or even destroyed computer for free, regardless of the reason or who is at fault, but it will also pay for pick-up, shipping and delivery. For those not lucky enough to have this cover, the alternative is a limited warranty. Known as a parts and labour warranty, it means that if your system fails during the designated period, the vendor (or its service organisation) will fix or replace it free of charge.

Onsite service is probably the most trouble-free system for the user. Instead of shipping your computer or failed part back to the vendor or manufacturer, a technician will come to you to get your computer up and running again. This usually saves both time and money.

Read the small print

If you live in a remote rural area, you may find that your supplier simply cannot fulfill its onsite service promise. There could be other provisos as well to cloud your horizon. These include charging for call-outs that prove unnecessary, or insisting the machine is serviced at the premises of the registered owner. You will find the nitty-gritty of the repair procedure in the small print; make sure it suits your situation.

One notch below onsite service is walk-in service. Instead of an engineer coming to you, you take your equipment to a local service centre for attention. This is a good compromise, but return-to-base repairs are by far the most popular system. You either ship the faulty equipment back to the supplier, or all the relevant parts are shipped to you overnight for you to install yourself. The advantage of DIY repair is that it is far quicker than postal servicing and the shipping costs are generally smaller than for a whole system.

If you do have to send your equipment away for repair, you need to know who pays for shipping costs. This is usually set out clearly in the warranty agreement. The most common policy is to go Dutch: you pay for the faulty goods to be shipped for repair and the manufacturer or reseller bears the cost of shipping them back to you. Again, check before you send.

Down-time

The biggest inconvenience you have to suffer if your equipment goes wrong is waiting for it to be fixed. A comprehensive guarantee should clearly state how long you can expect it to take. Many companies aim to get an engineer over to you by the end of the next working day, but in most cases this is only an estimate and not binding. Users who pay extra for an onsite option often get a quicker reaction. When postage is involved, a reasonable turnaround is five working days. Look for a warranty that gives you a clearly defined timescale, or ask the salesperson to be specific about repair times.

Every guarantee must say words similar to: 'this document does not affect your statutory rights'. If any warranty reads: 'this is the only warranty of any kind, either express or implied and no other oral, written information or advice shall be in force', beware, as this is a dodgy document. It is actually an

Buyer's checklist

Ordering

- Have you thoroughly checked the promises made in the ad?
- Have you allowed time for credit card or cheque clearance?
- Is the delivery time given in the ad 'usual' or 'best'?
- If it is 'best', are you paying an additional courier charge for swifter service?
- Check whether the price includes any taxes due.
- Are you sure that the supplier's warranty covers your projected use?
- Make sure your full postcode and telephone number is part of the order.
- Do you have contact details of the courier to allow delay investigation?
- Get a delivery number so you can quote it to the courier.
- Is the delivery price per box, per item or per consignment?

Delivery

- When you sign for delivery mark the delivery note 'unexamined'.
- Write down the time and date yourself — don't leave them blank.
- Check everything as soon as possible.
- Keep the packaging for at least six months.
- Call the supplier immediately if there are any problems with the courier.
- In case of a compensation claim, keep a full list of the costs.

infringement of your legal rights and should be ignored.

Other things to watch out for are dealers' warranties that try to pass all responsibility for repair on to the original manufacturer. By law the seller is just as liable for any problems. However, it's sometimes simpler to deal directly with the manufacturer and, if you want to, you're at liberty to do this.

There are exclusion clauses that are perfectly permissible. Guarantors can deny responsibility for equipment they believe to have been mistreated. Other warranties rule out 'acts of God' and environmental conditions, such as failure of the air conditioning or power supply. Damage caused by faults in attachments and associated equipment may also be excluded.

The legal safety net

The main thing to remember about warranties is that, whatever they may say, they don't affect your statutory rights in any way. Most states' consumer legislation states that goods for sale must be accurately described, they must be of saleable quality and fit for their purpose.

So if you buy a computer and the hard disk immediately crashes, it is neither of saleable quality, nor fit for its purpose.

Even if this catastrophe strikes six months after a one-year guarantee has expired, you can reasonably argue that a hard disk life expectancy is much longer. This does depend on atmospheric, environmental and workload conditions though, so don't try to push too many claims if you live down a mine in the far north!

Repairs come under the overall description of service, so any work should be carried out with reasonable skill and care. Consequently the supplier of that service is liable for failed repairs or any other damage caused by careless engineers.

If no timescale is set down in the guarantee, repairs must be carried out 'within a reasonable time' of reporting the fault and at a reasonable cost (although if you are under warranty there often is no charge).

Consequential loss

If equipment problems have caused operational hold-ups, you can look at compensation for any loss or damage you've suffered. This can be described as consequential loss. This is a limited right, which means it can cover any loss the court thinks arose as a result of a direct and provable link between the equipment problem and the resulting loss of productivity. It does not cover anything without a direct link, however.

If the hard disk on your six-month-old PC fails and you lose all your data, this might constitute a claim for consequential damage. In reality, most guarantees exclude paying damages which were caused as a result of equipment failure. But if you were prepared to take the matter to court, the manufacturer's caveat may well fall down.

Most warranties are perfectly above board and most manufacturers and resellers do shoulder their responsibilities without any qualms. But it's worth knowing where you stand in the eventuality that something goes wrong, preferably before you pick up the phone and buy.

How to assess grey imports

When you come across a product which bears a fantastically low price-tag compared with a seemingly identical product from another supplier, the chances are you are being offered a 'grey import'. In most respects, grey-imported hardware and software is identical to other products in the direct channel, but they are different in the way they are obtained and sold by dealers.

A grey import is hardware or software that is purchased abroad (often in the US) and then sold locally. Because US prices are often significantly lower than our retail prices, the grey imports cost much less than the 'official' versions of the same product.

The attraction

Grey imports appear attractive because of the price difference, but there are other issues to bear in mind. For hardware, often the only difference between local and US-sourced products is the power supply, and this will almost certainly have been addressed by the vendor.

But software poses more potential problems, such as US keyboard settings and screen layouts. You can overcome these kind of software irritations if you make sure you are buying an international version: these can be configured to local layout when you install them.

And what about support when things go wrong? The extent of backup available to buyers of grey imports generally depends upon the generosity of the original hardware manufacturer or software publisher, and their attitude towards grey sales of their products. Many manufacturers, particularly those with third-party resellers, are strenuously opposed to the sale of grey import products. It not only cuts their own profit margins and those of their resellers, but it also provides their Australasian offices with support problems which they feel are not their responsibility, despite the fact that their name is on the product.

However, attitudes to grey imports vary, so don't take it

Should you pay to extend your warranty?

Most PCs come with a one-year guarantee. Before you pay more for an extended warranty, consider the following points:

- What does it cover?
- What doesn't it cover?
- Are labour charges or shipping included?
- Are all the parts included?
- Is wear and tear on all components covered?
- Are there any restrictions?
- Is the warranty in the form of an insurance policy?
- If it isn't and the seller goes into liquidation your warranty could be worthless. Long-term warranties of this kind, particularly from small suppliers who haven't been established for long, could be a gamble.

Warranty checklist

- Ask to see a written warranty before you buy.
- Ask about implied warranties.
- Are you covered for parts only or parts and labour?
- Is maintenance onsite, return-to-base or local service centre?
- Who pays for delivery on returns, or parts?
- How long can you expect repairs to take — ask for examples.
- Does the warranty have any exemption clauses?
- Don't forget that some major components have their own manufacturer guarantee which is longer than the guarantee on the whole machine.
- Find out what repairs and upgrades will void your warranty.
- Ask if repairs have to be carried out by authorised personnel.

for granted that you'll be left in the cold. If you know what you are buying is a grey import, even if you are confident you can support it, it is worth checking out what would happen if you did need to call on someone for help.

Do your homework

From the buyer's point of view, the bottom-line advantages of buying grey imports are the most important issue. The problem is that if you don't do your homework, you may not discover until it's too late that the supposed bargain that you've just splashed out on is an unauthorised copy. That can turn out to be very costly, both in terms of time and money. How long grey imports will continue to be sold here is open to debate. They exist only because there is a difference between the domestic price and the price in the US; any downward changes in local prices will diminish this part of the market.

The pricing policies of many international PC companies are towards a standard international price irrespective of the country of sale. As a result, the big savings that can be made by buying from the US may soon be over. With prices standardised, the customer can get a local keyboard, documentation and printer drivers optimised for the domestic market at the same price. This gives little advantage in buying from a grey importer.

Nonetheless, grey imports are likely to continue in certain areas. If the US recession continues its downward curve, the distributors there may well increase their efforts to maintain cash flow and competitive advantage by dumping surplus locally sourced products on overseas markets.

This can also be the case when manufacturers launch products considerably earlier in the US than they do in the Pacific region.

Potential drawbacks

The prospective grey purchaser simply needs to be aware of two potential drawbacks. First is that a grey product may not be tailored to the local environment, and second is that it may not come with any support. This is complicated by the fact that there is no legal requirement for advertisements to state the source of their products. But then there is nothing illegal or immoral about buying a grey import product; indeed it can be used as a legitimate source of certain kinds of product and save you a considerable amount of money.

If you think you can get around incompatibility problems and service the product yourself, you could be onto a winner. If not, a grey product could end up costing as much if not more than an authorised version. The gamble can be reduced considerably if you check things out beforehand. Nowhere else is the caveat emptor advice more appropriate than when buying grey imports.

Grey checklist

- Check that the product is covered by some kind of warranty.
- Ask if the product conforms to local standards and protocols.
- Be realistic about your need for support. Ask how much it will cost for third party support.
- Check the manual and box for country of origin before breaking any seals.
- If you buy a grey import and it is a dud, contact the local importer's office. They may provide a current local version at little or no cost.

How to keep your software legal

When it comes to PC software, the normal respect for the law tends to go completely out of the window. Few people realise that they are committing a serious offence when they copy games software for friends. But the direct buyer of business software is liable to prosecution for this kind of offence. You should be aware of the law and how it is being enforced.

Being found in possession of illegal software, wherever it comes from, could prove extremely costly. So far no-one has gone to prison for using illegal software, but some large companies have had to make large cash settlements to injured software suppliers.

Software copyright is governed by copyright legislation which really is not designed for the task and has several loopholes. However, under the existing law, a piece of software is regarded as the intellectual property of the person who wrote it, or the company which employed that person to write it. The owner of the copyright has the exclusive right to copy the work. This means any copying which is unauthorised by the copyright owner is illegal.

The owner of the software — usually the software publisher — has the right to dictate to the user terms under which the software can and cannot be copied. This is where the software licence comes in. Most licences allow the user to make a one-off backup copy of the master disk, and keep the master disk in a secure place so that it cannot be destroyed.

The small print of licences differs from company to company, and there are a number of different types of licence. The wide variation between them adds to the nightmare and confusion faced by buyers trying to keep legal. Some include site licences, where a user pays extra for the privilege of being allowed to make copies of the master disk, and some offer network licences for several users on a network. And some licences allow users to make an extra copy of a package to run on their portable PCs as well as on the office machine; as long as only one copy is in use at any particular time. But many licences only allow one copy anywhere at any time.

Legal checklist

- Only buy legal; is it shrink-wrapped and boxed — not in a plain envelope?
- Make sure there is a proper manual and a licence agreement.
- Look for a hologram or perishable sticker on genuine products.
- Check the small print on the licence.
- Make sure you keep track of all backup copies.
- Keep all master disks and purchase invoices safely.
- Register all your shareware.

Look legal

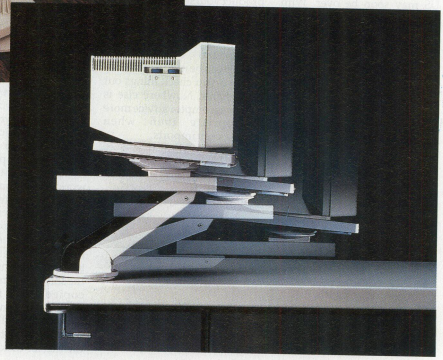
Legal software should come shrink-wrapped in a printed box with separately wrapped manuals and a licence agreement. Pirated software often comes in an envelope with disks and manual all in one packet. Make sure you recognise the real thing.

If you use shareware, the same rules apply as for software purchased in a conventional way. Shareware is initially bought on a 'try it and see' basis, but once the trial period is up, you have to register if you want to continue to use it legally. Software acquired through bulletin boards is also subject to the same law. Not only that, the authors depend on your honesty for their living, so make sure you pay up.

Firm hands on the controls:

The Ergonomics





of computing

Having the latest and best on the computing front can be a waste of time if the user is not capable of working efficiently. The man-machine interface is the most important part of any data-processing chain. We look at the best ways to make mixing it with your PC the most comfortable experience possible.

THERE YOU ARE, 486 equipped, XVGA informed, CD-ROM data sourced and listening to the Highest of Fi through your sound card. But things just don't seem right. You can't relax, your eyes are sore and your fingers creak when you type. The answer is obvious: you are still living in ergonomic poverty.

Although we are prepared to spend thousands of dollars on the electronics of computing, few of us spend a tiny percentage of that on making ourselves comfortable when working at the PC. Don't be deceived; the wrong use of a computer and its ancillaries can do serious damage to your wrists, eyes, back and lungs. Other parts of your body, too, if you don't treat it and yourself to the right equipment and situation.

Before we look at the options, be warned that the area of ergonomics – the science of adapting equipment to worker – is awash with claims, plaudits and recommendations. As the legal world wakes up to the reality of RSI (repetitive strain injury) claims and 'Sick Building Syndrome' compensation cases, sales reps are bulging at the seams with overpriced gadgets, all guaranteed to cut the incidence of workplace injury.

Start here

The first place to start when looking for the ideal ergonomic workplace is not the lighting, desk height or position (although they are important), but at the user's sitting posture. Before you start worrying about desk and keyboard height, make sure the seating you have invested in is the best.

As well as a firm plush cushion which supports the buttocks and spreads the weight over the seat (beware hard plastic chairs that make for a numb bum), the seat should either support the back or promote a good spinal posture. At all costs avoid a chair that promotes the initially comfortable but long-term damaging 'banana back syndrome'. In the first case, a fully adjustable backrest is invaluable. Fixed backrests cannot accommodate all body types. Adjust the backrest to give a more upright stance when working – any slumping in the chair is a no-no.

Some workers prefer to work in the semi-kneeling position, promoted by the generic back-stool seats. One example of this kind of seating is offered by the EquipoisE seat from TEM which claims to balance body weight and give a correctly aligned spine – ideal for back-pain sufferers. These type of seat/stools spread the load between the lower legs just below the knees and the buttocks. The advantage of this position is the spine is left to sort itself out in as comfortable and vertical a position as possible. Note that these stools do require accurate placement of the monitor at the optimum height.

BY JEREMY TORR

The other aspect to look for when choosing seating is the mobility. If you have a fixed seat and have to twist to get at the drawer with the disks in, or have to lean sideways to answer the phone, you are asking for trouble. Choose a seat with both swivel action and castors built in. This will allow both easy movement without undue twisting, and the ability to move your chair at regular intervals to give slight positional variation.

Finally, if your desk is slightly higher than normal (see next section) a wise investment is a footstool. Far from turning you into an aged dodderer, this will help to stop you from becoming one. Lifting the knees up slightly increases the direct spinal weight transfer, again helping avoid the 'banana back' syndrome.

The best desk

According to one market survey, the average office desk is some 10 to 15cm higher than it should ideally be. Although this is good news for monitor position (see 'Position, position' box), the attendant problem is the degree of wrist flex introduced. If your wrist is flexed back at all you are risking a nasty case of RSI, accompanying medical bills and time off work. Consider either raising your chair, lowering the desk if possible, or investing in one of those under-desk keyboard tidies. The advantage to this solution is the increase in desk space as well as a lowering of the typing area.

These add-on drawers are available from your local office supplier and many furniture stores. If your desk is just too intractable to put into decent working order, have a look at one of the specially built computer workstation desks. These have everything in the right position, in line with each other and at approximately the right height. They also allow you to slide the screen and keyboard away out of harm's way when you have finished your work.

Look for a desk that allows you to move around slightly. Any constricted working area is likely to lead to an increase in stress, corresponding muscle tension, and therefore aches and pains. And lastly, although generally speaking organics and computers don't mix, consider putting a small plant on your desk. Some recent studies have linked lower heart disease and stress levels with the relaxing effects of natural flora and fauna. If nothing else it will remind you of the world outside.

Monitoring the system

On many desks, it is often difficult to put the monitor in the best position because of physical limitations. If you have a slimline casing, a mini-tower or even a PC under the desk, the screen will probably be too low.

The depth of the desk is often an additional factor. If it is shallow or you are next to a wall or a door, you may not be able to put the screen far enough away from your seat. Or you may not be able to line it up with your eyes, even at the limit of the monitor's tilt and swivel adjustment. The answer in this case is to use a monitor support arm.

These, like the MCA range from Miller Ergonomics, usually clamp to the edge of the desk and use articulated joints to allow you to position your screen perfectly in mid-air.

The added bonus these items bring is more desk space, and the keyboard can sit back as far back on the desk as you want it to.

Make sure the support arm you choose can cope with the weight of your monitor — some of the higher resolution 20in models weigh an awful lot. Some form of user adjustment is also desirable — having the monitor rendered totally immovable may be good security but is not so good ergonomically. Other solutions to the monitor position are wall-mounted supports and fixed-height stands.

One other growing concern which applies to monitor performance is the level of electromagnetic and extra low frequency (EMR and ELF) emissions. The currently accepted international standard is based on the Swedish MRPII standards. In many cases this makes use of some kind of built-in metal shielding around the CRT (cathode ray tube) section of the casing.

Although most current models are fitted with this shielding internally, you can retrofit older models with an external shield. This may not look so dandy, but is claimed to cut down EMR/ELF emissions by as much as 60 per cent. One such example of this is the Emrase Magshield, or the Radshield range of add-on products.

Interface time

Once you have got all your body parts in

Caution: False premise

Although, generally speaking, the use of supports is a good idea when sitting at a PC, some researchers in the US have discovered links between supports and wrist muscle problems. One investigation showed that the use of Wrist Splints could help cut down muscle tension in the short term, but may also lead to a longer-term weakening of the wrist muscles.

If you are unsure whether or not to use supports, you are probably better off with a timer on your PC set to go off at 20 minute intervals. When it sounds, take a short walk, look out of the window, breathe some outside air and flex your linked fingers back and forth for a few minutes.

All these things will exercise your back, arm, leg and chest muscles as well as increase oxygenated circulation. Looking at distant objects will give your eye muscles some exercise and help your tear ducts lubricate the eyeball.

Remember, support is okay, but self-supporting is even better.

Position, position

In any situation the most potentially damaging aspect of computer usage is usually your normal typing position. The old teacher's adage of, sit up and take notice, has more than an element of truth in it.

First, position yourself so your back is as straight as possible. In reality, that is slightly concave with the neck directly above the lower back. Now adjust the chair height so that your elbows are about level with the desk. This gives optimum wrist support when typing; angled up or down is not good. Check your upper legs as near to parallel with the underside of the desk is best; if necessary prop up your feet with books or a stool.

Now make sure the monitor is in the right place. It can be as close or as far away as you like (usually about 60 to 70cm) as long as you are comfortable, but the centre of the screen should be just below the level of the eyes. Any higher or lower will result in cricked necks and aching shoulders — sound familiar?

Now check out the keyboard. The keys should be approximately 15cm behind the edge of the desk to give you sufficient wrist support whilst working. Ideally the keyboard should angle up slightly, and be directly in line with the monitor so you don't have to twist your head to see the screen. If you are using a mouse it should have enough room at the side of the keyboard to move in, or be within easy operating distance.

Shopping tips

- Use equipment you like. Uncomfortable is unproductive.
- Programmable keyboards can save innumerable keystrokes.
- A big trackball is more comfortable than a small mouse.
- Keyboard tidies can make a big difference to typing comfort.
- Feeling strange does not mean equipment is no good; especially if you have developed some previous bad habits.
- Small spends (wrist rests, copyholders) can give big dividends.
- Spend most on your chair — it is your most important asset.
- Screen filters can work wonders for tired eyes.

the right place and comfortable, it is time to think about the peripherals. This includes wrists, fingers and eyes; via the keyboard and the screen output. Most reported problems stem from these two areas of interaction.

When you are looking at the screen, make sure there is no unwanted glare or reflection. If possible, place your screen at right angles to any light sources such as windows or lights. In any situation where a screen is being used, indirect lighting is best; you do not want either direct or reflected light to interfere with the message from the screen.

Reflections can also cause the user to increase brightness and contrast which may lead to eyestrain. In some cases where it is difficult to obtain optimum lighting conditions, a screen filter can be used over the front of the monitor to cut down glare and reflections. The VuTek optical glass screen range (Miller) claims up to 99 per cent of glare reduced without the reduction in light levels introduced by some mesh screens. If you want to have a well-known brand name on your screen, Polaroid also makes screen filter sheets.

Screen flicker is also a reported cause of workplace problems, with allegations that headache, migraine and even epileptic attacks have been being triggered by a badly flickering screen. Refresh rates of over 72Hz are now almost obligatory when using GUI interfaces. In some cases, polarised sunglasses can provide a short-term solution to this problem, but make the wearer look slightly foolish indoors.

Next to check out are the digits and wrists. Many seasoned typists use wrist support pads to ensure they do not fall victim to Carpal Tunnel Syndrome. This is when the median nerve — which gives the thumb, middle and index fingers and a few other bits of finger their muscle control and sensation — becomes damaged where it passes through the wrist bones.

Taking the weight off the wrists is said to alleviate this problem (also known as wrist RSI), and manufacturers have not been slow to provide plenty of solutions for keyboard operators. The Ergo-Tronics range is a good example, with anything from simple raised pads to antistatic, clamp-to-the-table articulated arm and wrist supports.

Whatever you choose to use — even an old sock filled with other old socks will do — getting into the habit of resting your wrists on some supportive surface every 15 minutes or so is vital for the long-term health of your typing fingers.

Where you put the copy when you are entering data is also an important issue for comfortable and healthy working. Unless your original copy is next to the screen you will be constantly twitching your neck from side to side as you glance from desk to screen and back. Here, the answer is one of those natty copy holders that clips to the screen and keeps everything nicely within the field of view. These are available for a few dollars from most office suppliers

Pointing perils

If your work involves lots of mouse working, the risks of more finger strain are still higher. Mousing involves the likelihood of a sharply bent back wrist, with much tensing of fingers and short, sharp movements - try it and see. Some input devices (like trackballs) aim to get round this by giving a larger area for the hand to rest on, and thumb-operated buttons to ease the finger strain. Another approach comes from the A4Tech WinMouse which comes with a special built-in wrist support.

The graphical input alternative is to use one of the new style of pen mice, or even a pen tablet. The advantage with these input devices is the method of grip. The whole hand moves as opposed to separate fingers; this is less likely to lead to nerve strain. Examples are on offer from Genius and A4Tech which simply plug in to the normal mouse port or RS-232 socket.

The only other option you have here is to cut down completely on the clicking you do with the mouse buttons; just use it as a pointer. By loading a voice recognition system such as VoiceAssist from Creative, you can tell your PC to Open, Save or otherwise manipulate the data to which you are pointing. This will obviously be more expensive, but if you are engaged in repetitive and consistent reformatting of text, this could be a real advantage.

No-cost options

It may seem like we have been discussing a lot of small things. Does clipping original copy at eye level, resting your wrists and using a footstool really make that much difference? In isolation, probably not, but together they will. And if you get into the habit of flexing your interlocked fingers a few times every hour, looking out of the window or across the office at regular intervals, stretching your legs under the desk or standing up at intervals, you are likely to notice an improvement in your working style.

If you use a laptop, do your eyes a favour by working in big, bold fonts, then setting them back to the right size before saving and printing. Don't spend minutes hanging over the laser waiting for your results to drop into the tray. Spend that dead time taking a walk down the corridor or outside. And if the boss really won't spend any money on that new chair, try kneeling down and typing for a short while every now and again. It looks really silly, but does wonders for your posture.

Remember it is a cumulative series of small improvements which can make a big difference to your industrial health. Just bear in mind that in the US, over 50 per cent of 1992's work related injuries were put down to RSI. Translate this into the cost, both personal and financial, suffered by the workers and their employers, and you will come up with a bill totalling billions of dollars worldwide.

So make sure your workplace is as ergonomic as it can be — don't put up with cramped and uncomfortable equipment. It could well cost you in the long run.

Contact suppliers:

Miller Ergonomics (03) 532 2777
TEM (044) 641 101
A4Tech (03) 328 1689
Creative Pacific (02) 906 8887
Moniflex (03) 706 9777
ErgoWorks (02) 489 2151
Radshield (075) 983 311

POINTING DEVICES

With the increasing use of GUIs and portable computing trends, there is considerable more focus being placed on the effectiveness of pointing devices. The following table lists mouse and trackball devices available for desktop computers.

Explanation of terms

Trackball This uses the same technology as a mouse, but instead of rolling the mouse around the desk, a stationary ball is moved with the fingers to provide cursor movement.

Dynamic tracking Allows the user to increase the number of pixels the cursor moved per increment of mouse movement.

Tracking This refers to the actual signal technology between the pointing device and the computer. The signal can be sent either optomechanically (via a cord), by infrared (without a cord), or by a ball pointing device (trackball).

Emulations There are several pointing devices which have become recognised as de facto standards. These include devices manufactured by Apple, Microsoft, Mouse Systems and Logitech Systems.

Name	Distributer	Manufacturer	Mouse or trackball	Tracking	Dynamic tracking	Interface	Number of buttons	Cord length (m)	Apple mouse emulation	Microsoft mouse emulation	Mouse Systems mouse emulation	Logitech mouse emulation	Warranty	Price (including tax)
AGM-600E Mouse	Optima (02) 638 1222	Sysgration	M	O	✓	Serial	3	1.8		✓	✓		12 months	$25
Animas AS M130 OptiOne Mouse	Animas (08) 235 2388	Kun Ying	M	O	✓	Bus	1	2	✓				12 months	$125
Animas AS MS35OP MacPro Mouse	Animas (08) 235 2388	Kun Ying	M	O	✓	Bus	3	2	✓				12 months	$90
Animas AS MS330P OptiPro Mouse	Animas (08) 235 2388	Kun Ying	M	O	✓	Bus	3	2	✓				12 months	$135
Animas AS MST320 Track Mouse	Animas (08) 235 2388	Kun Ying	M	O	✓	Bus	3	2	✓				12 months	$85
Animas AS MST320 Track Mouse	Animas (08) 235 2388	Kun Ying	M	O	✓	Bus	3	2	✓				12 months	$110
Apple Desktop Bus Mouse II	Apple Computer (02) 452 8000	Apple Computer	M	O		Bus	1	0.8	✓				12 months	$95
BMC Cordless Mouse	Technology for Business (07) 367 1411	BMC Micro	M	I	✓	Serial	3	1.5	✓	✓	✓		12 months	$55
BMC Cordless Trackball	Technology for Business (07) 367 1411	BMC Micro	T	I	✓	Serial	4	5		✓	✓		12 months	$80
Bus Mouse	Microgram Computers (043) 34 1544	Supermouse	M	O	✓	Bus	2	1.8		✓			6 months	$91
Dextra DM450	MILyn Imports (06) 235 2388	Dextra	M	O	✓	Serial	3	2		✓	✓		12 months	$23
Dexxa Serial Mouse	BJE Enterprises (02) 858 5011	Dexxa	M	O	✓	Serial	3	2.1		✓		✓	12 months	$38
Genius HiMouse	Genius (08) 235 2388	Kye	M	O	✓	Serial	3	2		✓			12 months	$92
Genius HiMouse Cordless	Genius (08) 235 2388	Kye	M	O	✓	Serial	3	2		✓			12 months	$142
Genius HiMouse Lite	Genius (08) 235 2388	Kye	M	O	✓	Serial	3	2		✓			Lifetime	$177
Genius HiPoint Mini Track	Genius (08) 235 2388	Kye	M	O	✓	Serial	3	2		✓			12 months	$124
Genius HiTrack	Genius (08) 235 2388	Kye	M	O	✓	Serial	3	2		✓			12 months	$115
Genius Jx Mouse	Genius (08) 235 2388	Kye	M	O	✓	Serial	3	2		✓	✓		12 months	$28
Genius Mouse One	Genius (08) 235 2388	Kye	M	O	✓	Serial	3	2		✓			12 months	$35
Genius Mouse Too	Genius (08) 235 2388	Kye	M	O	✓	Serial	3	2		✓	✓		12 months	$54

KEY

Mouse
Tracking

M — Mouse, T — Trackball
O — Optomechanical, I — Infrared
N/S — Not specified, N/A — Not applicable

POINTING DEVICES

Name	Distributor	Manufacturer	Mouse or trackball	Tracking	Dynamic tracking	Interface	Number of buttons	Cord length (m)	Apple mouse emulation	Microsoft mouse emulation	Mouse Systems mouse emulation	Logitech mouse emulation	Warranty	Price (including tax)
Honeywell Mouse	Honeywell (02) 370 4444	Honeywell	M	0	✓	Serial, bus	2 or 3	1.5	✓	✓	✓	✓	Lifetime	From $145
Logitech First Mouse	BJE Enterprises (02) 858 5611	Logitech	M	0	✓	Serial	3	2		✓		✓	12 months	$50
Logitech Kidz	BJE Enterprises (02) 858 5611	Logitech	M	0	✓	Serial	2	2.1		✓		✓	2 years	$64
Logitech Kidz for Mac	BJE Enterprises (02) 858 5611	Logitech	M	0	✓	Bus	3	1	✓				2 years	$74
Logitech Mouseman Bus Right Hand	BJE Enterprises (02) 858 5611	Logitech	M	0	✓	Bus	3	2.1		✓		✓	3 years	$96
Logitech Mouseman Cordless II	BJE Enterprises (02) 858 5611	Logitech	M	0	✓	Serial, PS/2	3	N/A		✓		✓	3 years	$179
Logitech Mouseman For Macintosh Right Hand	BJE Enterprises (02) 858 5611	Logitech	M	0	✓	Bus	3	1	✓				3 years	$106
Logitech Mouseman Serial & PS/2 Combo LH	BJE Enterprises (02) 858 5611	Logitech	M	0		Serial, PS/2	3	2		✓			3 years	$99
Logitech Mouseman Serial and PS/2 Combo Right Hand	BJE Enterprises (02) 858 5611	Logitech	M	0	✓	Serial, bus	3	2.1		✓		✓	3 years	$95
Logitech Trackman for Macintosh	BJE Enterprises (02) 858 5611	Logitech	T	0	✓	Bus	3	1	✓				3 years	$111
Logitech Trackman Portable	BJE Enterprises (02) 858 5611	Logitech	T	0	✓	Serial, PS/2	3	2.7		✓		✓	3 years	$150
Microsoft 400ppi Serial PS/2 Mouse	Microsoft (02) 870 2100	Microsoft	M	0	✓	Serial, PS/2	2	2		✓	✓	3	12 months	$139
Microsoft 400ppi Bus Mouse	Microsoft (02) 870 2100	Microsoft	M	0	✓	Bus	2	2		✓			12 months	$139
Microsoft Ballpoint	Microsoft (02) 870 2100	Microsoft	T	0	✓	Bus	2	0.25		✓			12 months	$199
Mouse Pen	Microgram Computers (043) 34 1544	Quick	M	0	✓	Serial	2	1.2		✓			6 months	$136
OCT-250 Mouse	Optima Computer (02) 638 1222	Sysgration	M	0	✓	Serial	3	1.8		✓	✓		12 months	$21
OCT-600E Mouse	Optima Computer (02) 638 1222	Sysgration	M	0	✓	Serial	3	1.8		✓	✓		12 months	$27
O Grid Mouse	Microgram Computers (043) 34 1544	Quick	M	0	✓	Serial	3	1.8		✓	✓		6 months	$86
Qtronix TB-90M/TB-90B Trackball	IAD (03) 800 2855	Qtronix	T	0	✓	Serial	3	1		✓	✓	✓	12 months	$95
Qtronix X-30M/X-30B Mouse	IAD (03) 800 2855	Qtronix	M	0	✓	Serial, bus	2	1		✓	✓	✓	12 months	From $49
Taiway Mouse	Microgram Computers (043) 34 1544	Taiway	M	0		Serial	3	1.8		✓	✓		6 months	$40
Winmouse Pro-5	A4Tech (03) 328 1689	A4Tech	M	0	✓	Serial	3	1.8		✓	✓		12 months	$55
Winmouse Pro-7	A4Tech (03) 328 1689	A4Tech	M	0	✓	Serial	3	1.8		✓	✓		12 months	$65
Witty PS/2 Mouse	Microgram Computers (043) 34 1544	Witty	M	0	✓	Bus	2	1.8		✓			6 months	$139
Workmate PC-I/M Industrial Mouse	APC (08) 363 0400	APC	M	0	✓	Serial	2	1		✓	✓		12 months	From $420

KEY

Mouse
M — Mouse, T — Trackball

Tracking
O — Optomechanical, I — Infrared
N/S — Not specified, N/A — Not applicable

A digitiser, or digitising tablet, is used to convert an image into digital signals for storing in a computer system. A digitiser takes the place of a mouse but has the advantage that it it very accurate and records the absolute position of the mouse rather than a record of mouse movement. Graphics and CAD applications are most suitable for these devices where accuracy is essential.

Explanation of terms

Work area Refers to the physical area where the stylus can be recognised by the digitiser, not to the dimensions of the digitiser.
Resolution Resolution generally means the number of dots per inch recorded for conversion into digital format. With digitisers resolution is described by lines per inch (lpi).

Name	Distributor	Manufacturer	Work area (L by W in mm)	Resolution (lpi)	Accuracy (mm)	Interface	Software included in price	Warranty	Price (including tax)
AceCad	TCS Group (02) 699 8300	AceCAD	120 by 120 120 by 180	1016	0.254	RS-232	✓	12 months	From $527
CalComp Drawingboard II Series	CalComp (02) 550 3933	CalComp	305 by 305 305 by 457 457 by 610 610 by 914 914 by 1219 1118 by 1524	2540	0.254	RS-232, ADB	✓	2 years	From $805
CalComp Drawingpad	CalComp (02) 550 3933	CalComp	191 by 191	1000	0.508	RS-232	✓	2 years	$780
CalComp DrawingSlate	CalComp (02) 550 3933	CalComp	229 by 152 305 by 305 457 by 305	1270	0.025	RS-232	✓	2 years	From $599
CalComp Estimat Series	CalComp (02) 550 3933	CalComp	762 by 914 914 by 1219	2540	0.254	RS-232	✓	2 years	From $3425
Genius GT 1212B	Genius (08) 235 2388	Kye	300 by 300	Up to 1000	0.254	RS-232	✓	12 months	$655
Genius GT1212 Hisketch	Genius (08) 235 2388	Kye	300 by 300	Up to 1000	0.254	RS-232	✓	12 months	$840
Genius GT1812 Hisketch	Genius (08) 235 2388	Kye	310 by 460	Up to 1000	0.254	RS-232	✓	12 months	$975
Genius GT906 Hisketch	Genius (08) 235 2388	Kye	230 by 160	Up to 1000	0.254	RS-232	✓	12 months	$361
GTCO Roll-Up Digitiser	TCS Group (02) 699 8300	GTCO	762 by 914	1016	0.25	RS-232C	✓	3 months	$3796
GTCO Super LII Series	TCS Group (02) 699 8300	GTCO	432 by 610 914 by 1219 610 by 914 1067 by 1524	1016	0.25	RS-232C	✓	3 months	From $3647
GTCO Ultima Series	TCS Group (02) 699 8300	GTCO	305 by 305 305 by 455	1016	0.25	RS-232	✓	3 months	From $682
Kurta IS-One	ACA (03) 388 0477	Kurta	280 by 216 305 by 305 305 by 430	1016	0.89	RS-232	✓	Lifetime	$785
Kurta XGT Series	ACA (03) 388 0477	Kurta	305 by 305 457 by 305	1270	0.254	RS-232		Lifetime	From $1051
Kurta XLC Series	ACA (03) 388 0477	Kurta	600 by 457 900 by 600 1200 by 900 1500 by 1050	1270	0.254	RS-232, ADB	✓	5 years	From $3051
Kurta XLP Series	ACA (03) 388 0477	Kurta	305 by 305 457 by 305 457 by 305	1016	0.635	RS-232	✓	Lifetime	From $665
Puma Plus	Roland DG (03) 428 1088	Hitachi	297 by 297	1016	0.127	RS-232C		10 years	$912
Talway Digitiser	Microgram Computers (043) 34 1544	Talway	297 by 297	1000	0.254	Serial	✓	6 months	$393
TDS LC Series	Anitech (02) 749 1244	TDS Digitizers	Up to 610 by 432	1000	0.25	RS-232	✓	12 months	From $2030
TDS Manitissa	Anitech (02) 749 1244	TDS Digitizers	Up to 914 by 1219	2000	0.05	RS-232	✓	12 months	From $7240
TDS Quora	Anitech (02) 749 1244	TDS Digitizers	Up to 915 by 1220	1000	0.20	RS-232	✓	12 months	From $880
TDS Quora Cordless	Anitech (02) 749 1244	TDS Digitizers	Up to 915 by 1220	1000	0.125	RS-232	✓	12 months	From $980

KEY

N/S — Not specified

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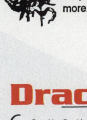
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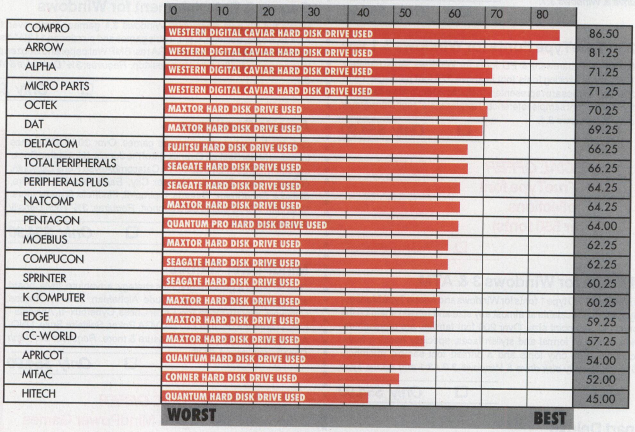
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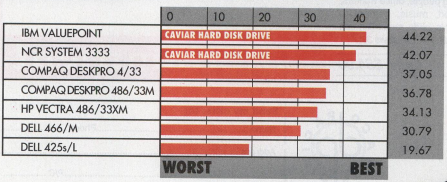
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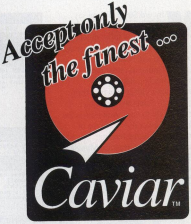
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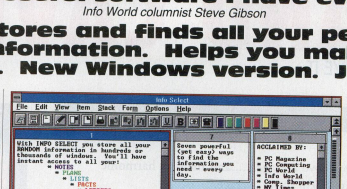
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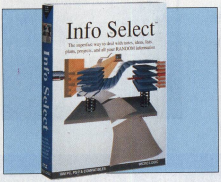
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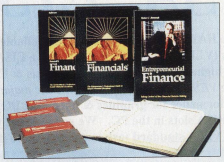
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- IDE Hard Disk controller

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MS-Dos 6.0 85
Hi-Res mouse 23

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- IDE Hard Disk controller

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Tystar SVGA 14" Monitor 460
MS-Dos 6.0 85
Hi-Res mouse 23

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Harris-E433/DV $1213
- Minitower or Desktop
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- 256K processor Cache
- 2x Vesa 32bit, 6x Isa 16bit slots
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- Ports: 2x Ser, Par Ptr, Game
- IDE Hard Disk controller

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Actix Prostar VL Graphics 261
Conner 125Mb IDE Hdd 363
Tystar SVGA 14" Monitor 460
MS-Dos 6.0 85
Hi-Res mouse 23

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- Ports: 2x Ser, Par Ptr, Game
- IDE Hard Disk controller

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Actix Prostar VL Graphics 261
Conner 125Mb IDE Hdd 363
Tystar SVGA 14" Monitor 460
MS-Dos 6.0 85
Hi-Res mouse 23

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- 1.44Mb 3.5" **Teac** FDD
- Ports: 2x Ser, Par Ptr, Game

4Mb Ram (Max 32Mb) 408
101Keyboard, Tactile 49
Actix Prostar VL Graphics 261
Conner 125Mb IDE Hdd 363
Tystar SVGA 14" Monitor 460
MS-Dos 6.0 85
Hi-Res mouse 23

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486-DX33 VESA+

Harris-P433/DV $1213
- Minitower or Desktop
- i80486DX 33MHz processor
- 256K processor Cache
- 2x Vesa 32bit, 6x Isa 16bit slots
- 1.44Mb 3.5" **Teac** FDD
- Ports: 2x Ser, Par Ptr, Game

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Vesa IDE Controller 126
W/Digital 170Mb Hdd 13ms 398
AOC Monitor 1024X768 495
MS-Dos 6.0 85
Hi-Res mouse 23

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- 256K processor Cache
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- Ports: 2x Ser, Par Ptr, Game

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101Keyboard, Tactile 99
Diamond Vesa Stealth 1Mb 378
Vesa IDE Controller 126
W/Digital 170Mb Hdd 13ms 398
AOC Monitor 1024X768 495
MS-Dos 6.0 85
Hi-Res mouse 23

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- Ports: 2x Ser, Par Ptr, Game

4Mb Ram (Max 32Mb) 408
101Keyboard, Tactile 99
Diamond Vesa Stealth 1Mb 378
Vesa IDE Controller 126
W/Digital 170Mb Hdd 13ms 398
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MS-Dos 6.0 85
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Logitech Desktop Trackman	127
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D'mond STlth Pro 2M 1280 x 1024	699
D'mond Stealth Pro 2 M 1280 x 1024	725
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ATI UltraPro 2M 1280 x 1024	734
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VESA	
D'mond Sp'dstar 1M Vlb 1024 x 768	261
Diamond Stealth 1M 1280 x 1024	472
Diamond Viper 2M 1280 x 1024	831
Actix 32Vl 1M S3 1280 x 1024	441
Actix 32Vl 2M S3 1280 x 1024	599
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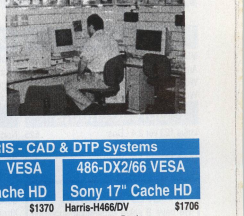
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Hi-Res mouse 23
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- IDE Hard Disk controller

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Honeywell 101Keyboard 99
Trident Graphics 1Mb 115
Conner 85Mb IDE Hdd 349
Tystar SVGA 14" Monitor 460
MS-Dos 6.0 85
Hi-Res mouse 23
3COM Ethernet III, 16bit 251

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486-DX33 VESA Mitac 15", 85Mb, 8Mb

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- 256K processor Cache
- Ram, Max 32Mb
- 2x **Vesa**32bit, 6x Isa 16bit slots
- 1.44Mb 3.5" **Teac** FDD
- Ports: 2x Ser, Par Ptr, Game
- IDE Hard Disk controller

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Honeywell 101Keyboard 99
Diamond Vesa Stealth 1Mb 378
Conner 85Mb IDE Hdd 349
Mitac 15" Monitor, .28 799
MS-Dos 6.0 85
Hi-Res mouse 23

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486-DX2/50 VESA Sony 17" Cache HD

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- 256K processor Cache
- Ram, Max 64Mb
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- 1.44Mb 3.5" **Teac** FDD
- Ports: 2x Ser, Par Ptr, Game

Vesa-Ide HDC/FDC Contr. 126
8 Mb Ram 816
Honeywell 101Keyboard 99
Diamond Vesa Stealth 1Mb 378
W/Digital 212Mb Hdd, 15ms 432
Sony 17" Monitor, .31 1990
MS-Dos 6.0 85
Hi-Res mouse 23

$4555ex **$5319**

486-DX2/66 VESA Sony 17" Cache HD

Harris-H466/DV $1706
- Minitower or Desktop
- i80486-DX 66MHz processor
- 256K processor Cache
- Ram, Max 64Mb
- 2x **Vesa**32bit, 6x Isa 16bit slots
- 1.44Mb 3.5" **Teac** FDD
- Ports: 2x Ser, Par Ptr, Game

Vesa-Ide HDC/FDC Contr. 126
8Mb Ram 816
Honeywell 101Keyboard 99
Diamond Vesa Stealth 1Mb 378
W/Digital340Mb Hdd, 11m 638
Sony 17" Monitor, .31 1990
MS-Dos 6.0 85
Hi-Res mouse 23

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- Ram, Max 32Mb
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- 1.44Mb 3.5" **Teac** FDD
- Ports: 2x Ser, Par Ptr, Game

8Mb Ram 816
Buslogic vesa/SCSI Cont. 598
Fujitsu 330Mb Hdd, F/Scsi 795
101Keyboard, Tactile 49
Trident Graphics 512K 79
Philips Mono VGA monitor 257
3COM Etherlink III, 16bit 251

$3596ex **$4183**

486-DX2/66 EISA 330Mb, F/Scsi, 16Mb

Harris-H460F/VE 2762
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- 256K processor Cache
- Ram, Max 32Mb
- 1x Vesa, 7 x Eisa 32 bit slots
- 1.44Mb 3.5" **Teac** FDD
- Ports: 2x Ser, Par Ptr, Game

16Mb Ram 1440
Adaptec Eisa SCSI Cont. 1319
Fujitsu 330Mb Hdd, F/Scsi 795
101Keyboard, Tactile 49
Paradise Svga Accelerator 218
Acer S VGA Color monitor 519
3COM 3Combi Eisa adapter 447

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- 256K processor Cache
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- 1x Vesa, 7 x Eisa 32 bit slots
- 1.44Mb 3.5" **Teac** FDD
- Ports: 2x Ser, Par Ptr, Game

16Mb Ram 1440
Buslogic Vesa/Scsi Hdc 598
101Keyboard, Tactile 49
Trident Svga 512K 79
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Conner 340Mb, 12ms Scsi 677
Conner 540Mb, 12ms Scsi 1320
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Fujitsu 520Mb, 12ms 1470

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Hard Disks

Fujitsu

SCSI - 5 Year Warranty

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Fujitsu 520Mb, 12ms, F/Scsi 1470
Fujitsu 1.1Gb, 10ms 2190
Fujitsu 2.0Gb, 11ms 4019

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Acer 33D 14" 1024x768 .28 I 519
AOC 14" 1024 x 768 .28 NI 495
Mitac 15" 1280x1024 .28 NI LE 799
Sony 17" 1024x768 .25 NI 2298
Philips 14" 1024x768 NI .28 785
Philips 17" 1024x768 NI .31 1562
Philips 17" 1024x768 NI .26 1909
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RAM prices subject to change

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AT Buss Paddleboard FDD/HDD 64
Hdd/Fdc, 2x Ser, Par, Games 95
Hdd/Fdc w/Bios, Intelligent cont. 150
IDE Cached FDD/HDD controller. 402

SCSI Controllers: ISA

Adaptec 1510 Non-booting periph 178
Adaptec 1542C Fast SCSI Hd/Fd 454
UltraStor 14F Hdc/Fdc F/Scsi 514
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Novell Netware 3.12, 10 user	2729
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SuperStor Pro disk compression	179
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Xtree for Windows V2.0	99

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3Com Etherlink II 8 bit coax	346
3Com Etherlink III 16 bit coax	251
3Com Etherlink III 16 bit 10-T	251
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D-Link PCMCIA-2 Ether Adap, 10-T	499
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SMC 12+2 port s	1705
Intel 12 port f Netware 3.11	1031

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Adobe type manager f Win	139
Adobe plus 22 font pack	291
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Bitstream Facelift f W.Perf.	135
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Borland Turbo Pascal Dos	214
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Carbon Copy f Win	255
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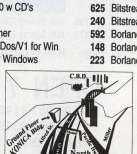
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Sony CDU7811 Scsi-2, 280ms, Ext	1056
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NEC CDR-84-1 Scsi, int	855
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T4600, 486-SL33, 4M, 120M	5129
T4600, 486-SL33, 4M, 200M	5733

Toshiba - Colour Notebooks DOS & Win.

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T1900C, 486-SX20, 4M, 200M pas	5195
T1950C, 486-DX2/40, 4M, 120M Pas	5445
T1950C, 486-DX2/40, 4M, 200M pas	6050
T1950C, 486-DX2/40, 4M, 120M TFT	6655
T1950C, 486-DX2/40, 4M, 200M TFT	7260
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Mitac - IntelLCD Notebooks

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Mitac 486-SX25, 4M, 212M	3690

Mitac - Intel Colour Notebooks

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Mitac 486-SX33, 4M, 200M passive	4790
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HP DeskJet 550C inkjet Colour	1498
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Canon LBP4i, 4ppm, 1M	1225
Canon LBP4u, 4ppm, 1M	1239
Oki 810, 8ppm, 1M	2325
DataProducts, 8ppm, 1M	1599
Canon LBP8-4, 8ppm, 2M, 2 Bin	2911

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HP LaserJet 4, 8ppm, 2M, 2 Bin	2998
HP LaserJet 4M, 8ppm, 6M, 2 Bin	3998
HP LaserJet 4ML, 8ppm, 4M, P/S	1885
DataProducts , 9ppm, 4M	3213
DataProducts A3, 15ppm, 4M	5733
Oki 830, 8ppm, 2M	2618

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* 486 SLC 33Mhz processor.
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* Flat square screen
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4/25C personal computer, the lightweight highly compact active matrix colour VGA notebook PC for heavy weights and heavy weights to be.

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* Enhanced parallel/serial ports
* External VGA port
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* Expansion kit
* Free VGA monitor
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Compaq ProLinear 4/33SX

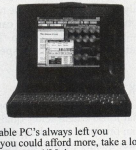


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DOT MATRIX PRINTERS

Dot matrix printers form images out of dots. The dots are formed by using one or two dot hammers that are moved serially across the paper. The more dots used, the higher the resolution. Dot matrix printers can be loosely split into two categories — 9-pin and 18/24-pin. The major advantages of using dot matrix printers are cost, speed and printing on multi-part paper.

What to look for

Resolution If you're using a 9 pin printer for correspondence, make sure that it has a near-letter-quality (NLQ) mode. This may take more than one pass over the paper. Printers with 24 pins can provide a better quality output, the best being letter-quality (LQ). The other advantage of 24 pin printers is that NLQ output can normally be achieved in a single pass.

Emulations The two major emulations are Epson and Proprinter. You should choose a printer which is capable of emulating these printers as they are supported by most software.

Fonts Some fonts and typefaces are normally included with the standard printer. It is possible to buy additional fonts.

Accessories These include tractor feeds, single or dual bins and cut-sheet feeders.

Noise The main disadvantage of dot matrix printers is the noise they generate. A soundproof printer stand is an option.

Consummables These include paper, ribbons and the printhead. The printhead is a major cost item.

Warranty Generally, warranty on dot matrix printers is Return to Depot.

Name	Distributor	Manufacturer	Number of pins	Rated noise level (dB)	Colour capability	Carriage width (inches)	Dots per character (H)	Dots per character (W)	Interface type	Graphics resolution (dpi)	Data buffer (K)	Draft speed (cps)	NLQ speed (cps)	Warranty	Price (including tax)
Apple ImageWriter II	Apple (02) 452 8000	Apple	9	N/S	✓	10	14	8	Serial	160	32	250	45	12 months	$745
Brother M-1324	Brother (02) 887 4344	Brother	24	58		10	24	29	Centronics, parallel	360 by 360	8	270	90 (LQ)	12 months	$520
Brother M-1824L	Brother (02) 887 4344	Brother	24	55	✓	11	24	29	Centronics, parallel, serial	360 by 180	64	337	112	12 months	$903
Brother M-1924L	Brother (02) 887 4344	Brother	24	55	✓	15	24	29	Centronics, parallel, serial	360 by 180	64	337	112	12 months	$1174
Brother M-4318	Brother (02) 887 4344	Brother	18	55	✓	16	9	9	Centronics, parallel, serial	240 by 216	96	800	150	12 months	$3548
C-Tech C8108 Plus	Anitech (02) 749 1244	C.ITOH	24	N/S	✓	10	36	20	Parallel or serial	360	32	240	80	12 months	$1590
C-Tech C6000	Anitech (02) 749 1244	C.ITOH	18	N/S		405	27	18	Parallel or serial	240 by 216	64	540	110	12 months	$3139
C-Tech ProWriter C-240	Anitech (02) 749 1244	C.ITOH	9	N/S		10	20	18	Parallel or serial	240 by 216	19.5	240	48	12 months	$795
C-Tech ProWriter C-245	Anitech (02) 749 1244	C.ITOH	9	N/S		15	20	18	Parallel or serial	240 by 216	19.5	240	48	12 months	$1007
C.Itoh C 315	Anitech (02) 749 1244	C.ITOH	9	N/S	✓	15	27	17	Parallel or serial	240 by 72	10	300	60	12 months	$750
C.Itoh C 715	Anitech (02) 749 1244	C.ITOH	24	N/S	✓	15	36	24	Parallel or serial	Variable	32	300	100	12 months	$950
C.Itoh C310	Anitech (02) 749 1244	C.ITOH	9	N/S	✓	10	27	17	Parallel or serial	240 by 72	10	300	60	12 months	$600
C.Itoh C615II	Anitech (02) 749 1244	C.ITOH	24	N/S	✓	15	36	20	Parallel or serial	360	32	300	100	12 months	N/S
C.Itoh CI-240	Anitech (02) 749 1244	C.ITOH	9	N/S		10	20	18	Parallel or serial	240 by 216	19.5	240	48	12 months	$795

DOT MATRIX PRINTERS

Name	Distributor	Manufacturer	Number of pins	Rated noise level (dB)	Colour capability	Carriage width (inches)	Dots per character (H)	Dots per character (W)	Interface type	Graphics resolution (dpi)	Data buffer (K)	Draft speed (cps)	NLQ speed (cps)	Warranty	Price (including tax)
C.Itoh CI-5000	Anitech (02) 749 1244	C.ITOH	18	N/S		16	27	18	Parallel or serial	330 by 216	8	540	110	12 months	$3139
C.Itoh CI-645	Anitech (02) 749 1244	C.ITOH	24	N/S	✓	15	36	24	Parallel or serial	360 by 180	32	480	120	12 months	$2119
C.Itoh CI245	Anitech (02) 749 1244	C.ITOH	9	N/S		15	20	18	Parallel or serial	240 by 216	19.5	240	48	12 months	$1007
C.Itoh CI6024	Anitech (02) 749 1244	C.ITOH	24	N/S	✓	16	36	24	Parallel, serial	360 by 216	28	925	308	12 months	N/S
Dataproducts 7034	Dataproducts (02) 451 3533	Dataproducts	24	55	✓	8	36	18	Parallel	360	8	216	72	12 months	$618
Dataproducts 7044	Dataproducts (02) 451 3533	Dataproducts	24	55	✓	15	36	18	Parallel	360	8	216	72	12 months	$669
Dataproducts 8524	Dataproducts (02) 451 3533	Dataproducts	24	55		16	36	18	Serial, Centronics	240 by 72	60	780	158	12 months	$2969
Dataproducts Rebel LX	Dataproducts (02) 451 3533	Dataproducts	33	55		16	36	18	Parallel, Centronics, serial	120 by 144	6	Up to 1800	Up to 680	12 months	$7774
Epson DFX-5000	Epson (02) 452 0666	Seiko Epson	9	N/S		13.6	N/S	N/S	Parallel, serial	240 by 72	3	480	96	12 months	$3987
Epson DFX-8000	Epson (02) 452 0666	Seiko Epson	9	N/S		13.6	N/S	N/S	Parallel, serial	240 by 72	3	960	192	12 months	$5901
Epson FX-1170	Epson (02) 452 0666	Seiko Epson	9	N/S		13.6	N/S	N/S	Parallel	240 by 72	24	380	68	12 months	$1122
Epson FX-870	Epson (02) 452 0666	Seiko Epson	9	N/S		10	N/S	N/S	Parallel, serial optional	240 by 72	24	380	68	12 months	$916
Epson LQ-100	Epson (02) 452 0666	Seiko Epson	24	N/S		8	N/S	N/S	Parallel	360 by 360	11	200	72	12 months	$457
Epson LQ-1060+	Epson (02) 452 0666	Seiko Epson	24	N/S	✓	13.6	N/S	N/S	Parallel, serial	360 by 180	6	295	98	12 months	$1358
Epson LQ-1070+	Epson (02) 452 0666	Seiko Epson	24	N/S		13.6	N/S	N/S	Parallel, serial optional	360 by 360	8	269	90	12 months	$939
Epson LQ-1170	Epson (02) 452 0666	Seiko Epson	24	N/S		13.6	N/S	N/S	Parallel, serial optional	360 by 360	64	330	110	12 months	$1358
Epson LQ-2550	Epson (02) 452 0666	Seiko Epson	24	N/S	✓	13.6	N/S	N/S	Parallel, serial	360 by 180	8	400	133	12 months	$1947
Epson LQ-570+	Epson (02) 452 0666	Seiko Epson	24	N/S		8	N/S	N/S	Parallel, serial optional	360 by 360	8	269	90	12 months	$693
Epson LQ-860+	Epson (02) 452 0666	Seiko Epson	24	N/S	✓	8	N/S	N/S	Parallel, serial	360 by 180	6	295	98	12 months	$1099

KEY

N/S — Not specified

DOT MATRIX PRINTERS

Name	Distributor	Manufacturer	Number of pins	Rated noise level (dB)	Colour capability	Carriage width (inches)	Dots per character (H)	Dots per character (W)	Interface type	Graphics resolution (dpi)	Data buffer (K)	Draft speed (cps)	NLQ speed (cps)	Warranty	Price (including tax)
Epson LQ-870	Epson (02) 452 0666	Seiko Epson	24	N/S		10	N/S	N/S	Parallel, serial optional	360 by 360	64	330	110	12 months	$1099
Epson LX-100	Epson (02) 452 0666	Seiko Epson	9	N/S		8	N/S	N/S	Parallel	240 by 72	4	240	48	12 months	$343
Epson LX-400	Epson (02) 452 0666	Seiko Epson	9	N/S		8	N/S	N/S	Parallel, serial optional	240 by 72	3	180	30	12 months	$292
Epson LX-850	Epson (02) 452 0666	Seiko Epson	9	N/S		8	N/S	N/S	Parallel, serial optional	240 by 72	4	240	48	12 months	$366
Facit E560	Nilsen Instruments (02) 736 2888	Facit	24	55	✓	10	20	36	Dual serial	360	8	216	72	12 months	$1027
Facit E570	Nilsen Instruments (02) 736 2888	Facit	24	55	✓	15	20	36	Dual serial	360	8	216	72	12 months	$1120
Facit E620 Series	Nilsen Instruments (02) 736 2888	Facit	9	50		10	9	12	Dual serial/parallel	240 by 144	12	250	60	12 months	$1722
Facit E630 Series	Nilsen Instruments (02) 736 2888	Facit	9	50	✓	15	9	12	Dual serial/parallel	240	12	300	60	12 months	$2424
Facit E750 Series	Nilsen Instruments (02) 736 2888	Facit	18	48	✓	15	36	24	Dual serial/parallel	240 by 144	12	400	125	12 months	$3332
Facit E760	Nilsen Instruments (02) 736 2888	Facit	18	55	✓	15	9	9	Dual serial/parallel	240 by 216	32	400	65	12 months	$4634
Facit E850 Series	Nilsen Instruments (02) 736 2888	Facit	18	48		15	72	140	Dual serial/parallel	72 by 240	12	350	110	12 months	$4782
Facit E950 Series	Nilsen Instruments (02) 736 2888	Facit	24	55		15	24	24	Dual serial/parallel	240 by 144	12	720	150	12 months	$6956
Fujitsu DL1150C	Fujitsu (02) 887 9222	Fujitsu	24	52	✓	11	24	16	Parallel or serial	360 by 360	24	180	60	2 years	From $850
Fujitsu DL1150M	Fujitsu (02) 887 9222	Fujitsu	24	52		11	24	16	Parallel	360	24	180	60	2 years	From $790
Fujitsu DL1250M	Fujitsu (02) 887 9222	Fujitsu	24	52		11	24	15	Parallel or serial	360	24	180	60	2 years	From $895
Fujitsu DL3800	Fujitsu (02) 887 9222	Fujitsu	24	49	✓	15	24	16	P arallel or serial	360	32	300	100	2 years	From $1495
Fujitsu DL4600C	Fujitsu (02) 887 9222	Fujitsu	24	55	✓	15	24	16	Parallel, serial	360 by 360	24	333	111	12 months	From $2495
Fujitsu DL5800	Fujitsu (02) 887 9222	Fujitsu	24	55		15	24	16	Parallel, serial	360 by 360	24	486	162	12 months	From $2900
IBM 4226 Model 302	Lexmark (02) 930 3500	Lexmark	9	55		15	12	9	Parallel, serial	144 by 240	22	533	100	12 months	$3372

KEY

N/S — Not specified

DOT MATRIX PRINTERS

Name	Distributor	Manufacturer	Number of pins	Rated noise level (dB)	Colour capability	Carriage width (inches)	Dots per character (H)	Dots per character (W)	Interface type	Graphics resolution (dpi)	Data buffer (K)	Draft speed (cps)	NLQ speed (cps)	Warranty	Price (including tax)
IBM PPS II Model 2380	Lexmark (02) 930 3500	Lexmark	9	55		10	9	12	Parallel, serial optional	240 by 144	43	320	65	2 years	$785
IBM PPS II Model 2381	Lexmark (02) 930 3500	Lexmark	9	55		15	9	12	Parallel, serial optional	240 by 144	43	320	65	2 years	$1027
IBM PPS II Model 2390	Lexmark (02) 930 3500	Lexmark	24	55		10	24	36	Parallel, serial optional	360	32	200	60	2 years	$785
IBM PPS II Model 2391	Lexmark (02) 930 3500	Lexmark	24	55		15	24	36	Parallel, serial optional	360 by 360	32	200	60	2 years	$1027
NEC P3200	NEC (02) 930 2000	NEC	24	52		11	24	37	Centronics parallel, serial optional	360	8	216	72	3 years	$544
NEC P3300	NEC (02) 930 2000	NEC	24	52		17	24	37	Centronics parallel, serial optional	360	8	216	72	3 years	$714
NEC P6200	NEC (02) 930 2000	NEC	24	54	✓	11	24	37	Parallel, serial optional	360	80	300	100	3 years	$821
NEC P7300	NEC (02) 930 2000	NEC	24	54	✓	17	24	37	Parallel, serial optional	360 by 360	16	216	72	3 years	$1218
NEC P9300	NEC (02) 930 2000	NEC	24	54	✓	17	24	37	Centronics parallel, serial optional	360	80	400	133	3 years	$1663
OKI ML 172	IPL Datron (02) 698 8211	OKI Electric	9	55		10	9	17	Parallel	240 by 216	2	180	30	12 months	$436
OKI ML 184T	IPL Datron (02) 698 8211	OKI Electric	9	57		10	9	17	Parallel	240 by 216	2	300	50	12 months	$577
OKI ML 320 Elite	IPL Datron (02) 698 8211	OKI Electric	9	57		10	113	17	Parallel	240 by 216	12	360	63	12 months	$979
OKI ML 321 Elite	IPL Datron (02) 698 8211	OKI Electric	9	57		15	13	17	Parallel	240 by 216	12	360	63	12 months	$1234
OKI ML 380	IPL Datron (02) 698 8211	OKI Electric	24	57		15	18	30	Parallel	360 by 180	8	180	60	12 months	$819
OKI ML 393B	IPL Datron (02) 698 8211	OKI Electric	24	57		15	30	18	Parallel	360	64	518	207	12 months	$2552
OKI ML 393C	IPL Datron (02) 698 8211	OKI Electric	24	57	✓	15	30	18	Parallel, serial	360	64	518	207	12 months	$2827
OKI ML3410	IPL Datron (02) 698 8211	OKI Electric	9	58.5		15	13	17	Parallel, serial	288 by 144	28	550	104	12 months	$3654
OKI ML390FB	IPL Datron (02) 698 8211	OKI Electric	24	58		106	30	18	Parallel	360	48	290	90	12 months	$1980

KEY

N/S — Not specified

DOT MATRIX PRINTERS

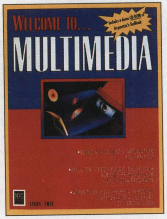
Name	Distributor	Manufacturer	Number of pins	Rated noise level (dB)	Colour capability	Carriage width (inches)	Dots per character (H)	Dots per character (W)	Interface type	Graphics resolution (dpi)	Data buffer (K)	Draft speed (cps)	NLQ speed (cps)	Warranty	Price (including tax)
Panasonic KX-P1121	Panasonic (02) 986 7400	Panasonic	24	52		11	30	24	Parallel	360	14	240	80	12 months	$469
Panasonic KX-P1180	Panasonic (02) 986 7400	Panasonic	9	52		11	18	18	Parallel , serial optional	240 by 216	2	192	38	12 months	$309
Panasonic KX-P1624	Panasonic (02) 986 7400	Panasonic	24	53		16	30	24	Parallel , serial optional	360 by 360	12	192	63	12 months	$939
Panasonic KX-P1695	Panasonic (02) 986 7400	Panasonic	9	52		16	18	18	Parallel , serial optional	240 by 216	16	330	66	12 months	$909
Panasonic KX-P2180	Panasonic (02) 986 7400	Panasonic	9	45	✓	11	18	18	Parallel , serial optional	240 by 216	4	240	38	12 months	$419
Samsung SP0912	Samsung Electronics (02) 638 5200	Samsung	9	58		10	18	24	Parallel , serial optional	240 by 216	2	160	40	2 years	$239
Samsung SP2412	Samsung Electronics (02) 638 5200	Samsung	24	55		10	24	36	Parallel , serial optional	360 by 360	8	240	80	2 years	$399
Samsung SP2421	Samsung Electronics (02) 638 5200	Samsung	24	57		15	24	36	Parallel , serial optional	360	8	276	84	2 years	$739
Star LC-10 Colour	Star Micronics (02) 748 4300	Star Micronics	9	N/S		10	18	23	Parallel , serial optional	240 by 144	6.5	144	36	12 months	$399
Star LC-100 Colour	Star Micronics (02) 748 4300	Star Micronics	9	N/S		10	18	23	Parallel , serial optional	240 by 144	2	180	75	12 months	$549
Star LC-20	Star Micronics (02) 748 4300	Star Micronics	9	N/S		10	18	23	Parallel , serial optional	240 by 144	4	180	45	12 months	$395
Star LC24-100	Star Micronics (02) 748 4300	Star Micronics	24	N/S		10	24	31	Parallel , serial optional	360	16	240	80	12 months	$695
Star LC24-20	Star Micronics (02) 748 4300	Star Micronics	24	N/S		10	24	35	Parallel , serial optional	360	16	240	80	12 months	$595
Star LC24-200 Colour	Star Micronics (02) 748 4300	Star Micronics	24	N/S		10	24	35	Parallel , serial optional	360	30	222	67	12 months	$795
Star LC24-30 Colour	Star Micronics (02) 748 4300	Star Micronics	24	48	✓	10	24	35	Parallel	360	15	192	64	12 months	$549
Star XB24-200/250	Star Micronics (02) 748 4300	Star Micronics	24	N/S		10/15	24	35	Parallel , serial optional	360	29/76	375	125	12 months	From $1350
Star ZA-200/250	Star Micronics (02) 748 4300	Star Micronics	9	N/S		10/15	18	23	Parallel , serial optional	240 by 144	320	420	84	12 months	From $1099

KEY

N/S — Not specified

Hot off the presses

If you want more multimedia, need help starting off with Paradox or running Windows on LANtastic, look no further!



Welcome to . . . Multimedia

Publisher: MIS: Press
Author: Linda Tway
Distributor: WoodsLane
Telephone: (02) 979 5944
Price: $49.95
ISBN: 1-55828-242-4

Another book jumps onto the Multimedia bandwagon! Welcome to Multimedia is an introduction to multimedia 'authoring' — the process by which you create MM applications.The book's general title might mislead. The book is highly focussed on 'authoring for IBM PCs running Windows, using Asymetrix's ToolBook authoring software.

The book opens with a general overview of multimedia issues — components, application areas, hardware and software requirements. This is rounded out with a short chapter on design issues. A long appendix lists sources of information, hardware and tools.

The material is well structured throughout. There are plenty of headings. Each short chapter has a summary and a glossary. A demo version of ToolBook (on CD) comes with the book. It installs to about 7.5M of hard disk space. A cut-down version of the real thing, it has a bunch of sample applications, and allows access to a subset of Toolbook's authoring tools. The demo version allows you unlimited browse time at 'reader' level, and six hours of design work for any Book. (You can reset timers on the sample Books by reinstalling.)

The latter two thirds of the book are a hands-on tutorial. By the end of it, you will have created a multimedia application using ToolBook. This experience will be useful for work with other authoring tools.

Tightly focussed and well structured, *Welcome . . .* serves well as a short course in Windows-based multimedia.

Michael Aitken

Paradox for Windows: Step by Step

Publisher: NewTech
Author: Peter McBride
Distributor: Butterworth-Heinemann
Telephone: (02) 335 4444
Price: $39.95
ISBN: 0-7506-0610X

Step by Step is aimed at beginners. Its 220 pages of large type and screenshots read like fleshed out notes for an 'Introduction to Paradox' course.

The book is designed to be worked through from start to finish. It opens with the Paradox desktop, and using single tables. The basics of table creation, forms and reports are covered. It then moves on to relating tables, graphical objects, and winds up with a quick introduction to ObjectPAL.

Step by Step makes some questionable statements. The book says that the Windows CardFile application is adequate as a flat-file database. We are told early that the purpose of a Paradox 'key field' is to "keep the file in order" — there is no mention of enforcing unique key values until much later in the book. Paradox strengths in complex queries are outlined, but we are advised not to use them because we might make a typing error.



I believe users would be better served by Borland's own introductory material (or other third-party books). The package ships with 2200 pages of documentation, and extensive online help. Chapters 4 through 13 of the Paradox for Windows 'Getting Started' manual are structured as a tutorial.

Step by Step adds little value, and is sometimes misleading.

Michael Aitken

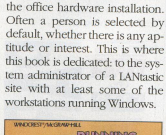
Running Windows on LANtastic

Author: Michael S. Montgomery
Distributor: Windcrest/McGraw Hill
Phone: (02) 417 4288
Price: $49.95
ISBN: 0-8306-4447-4

Windows is supposed to make working on the IBM PC easier. If this is the case, why is so

much shelf space in technical bookstores devoted to third-party volumes on Windows and Windows products designed to make the job of running your application software easier? We can ask the very same question about this book.

LANtastic, being a peer-to-peer network, does not have the overheads normally associated with traditional LAN installations along the lines of Novell. System administrators are usually not dedicated to the maintenance of the office hardware installation. Often a person is selected by default, whether there is any aptitude or interest. This is where this book is dedicated: to the system administrator of a LANtastic site with at least some of the workstations running Windows.



Montgomery treats us to some very simple basics to consider in the planning, installation and running of a LANtastic site. His treatment of the different workstation and server installations for multiuser Windows is very effective, but other points he makes in the early chapters are disappointing. For example, his advice for planning a local or server-based installation of Windows is just common sense. The introduction emphasises this is not a Windows manual, but a table, and some text is devoted to listing Windows files that can be deleted and an explanation of their purpose. Any Windows guide can provide this for you.

Thankfully, the bulk of the book is devoted to specific LANtastic and LANtastic for Windows material. For a person totally uninitiated to LANtastic, this is heavy reading, but if you are conversant with the concepts of networks then you should be able to blunder through, provided there was ready access to a live workstation to try out and familiarise yourself with the nuances behind LANtastic. It appears at times like an endorsement for converting from the DOS version to the Windows version, but this is due to the amount of emphasis on the NET and NET_MGR menus where most users will spend their time on a workstation. Like all applications that have made a life in DOS and Windows, the best solution when running in Windows is to have a Windows application and not a DOS program running with a PIF file.

User accounts and the Resource Access Control List should be familiar to anyone who has dabbled with the network. This is where I found the going tricky. It is hard to criticise Montgomery for the effort he makes in covering as much detail as possible. The distinction between plain common sense for an ordinary user and superfluous information for an administrator is a fine line that needs to be drawn, and this book covers a lot of ground on specific applications running under a networked environment and how the network behaves under certain situations.

This book is ideal for the workstation user who wishes to wield a bit more power or efficiency on the LAN; the administrator who became anointed into the job by default; or the user who needs some background or reference handy when the regular administrator is away.

David Lin

Newnes PC Programmer's Pocket Book

Publisher:	Butterworth Heinemann
Author:	Stephen Morris
Distributor:	Butterworth Heinemann
Telephone:	(02) 335 4444
Price:	$34.95
ISBN:	0-7506-1386-6



You'd need a tough pocket for this pocket book. It's narrow, but weighs in at 400 pages.

Its focus is MS-DOS running on IBM and compatible PCs. The core of the book is a reference on DOS interrupts and functions. Morris opens with 30 pages on PC architecture, covering topics like the high memory area, video RAM and direct memory access. A chapter on programming principles takes a low-level look at programming the PC, with a sprinkling of assembler examples.

After describing the components of DOS (the book covers Versions 1 through 6), and introducing interrupts, Morris hits his stride with a series of chapters on system facilities. Each chapter describes an aspect of the PC's operating system, and details the interrupts and functions you use to access it. Topics include the system clock, input devices (including mice, light pens and joysticks), video display, sound (PC speaker only), ports, drives, directories and files. There are many useful tips.

Morris's writing is tight and clear. His book would be useful as a portable, low-level programming reference for the PC.

Michael Aitken

Ray Tracing Creations

Publisher:	Waite Group Press
Author:	D Wells and C Young
Distributor:	WoodsLane
Telephone:	(02) 979 5944
Price:	$79.95
ISBN:	1-878739-27-1

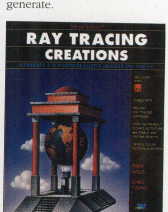
Ray Tracing software generates pictures. Typically, you define a 3D scene, light sources and a 'camera'. The program produces the image by simulating the camera's view of light rays reflecting off the objects in the scene.

Ray Tracing Creations is more a software package than a book. It is essentially a manual for a particular brand of ray tracer — 'Persistence of Vision' or POV-Ray.

Mostly freeware (some of the add-ons are shareware), POV-Ray is included on-disk with the book.

Written by two key members of the development team, the book will do much to make ray tracing more accessible. Its colour plates of brilliant ray-traced pictures are an excellent ad for the software. The authors introduce ray tracing and POV-Ray in a short opening chapter. The concepts are explained well.

The pros and cons of ray tracing are outlined in an unbiased way. In short, the good news is the quality of the pictures. The not-so-good news is that you use a scripting language, and that highly complex images can take days to generate.



After the introduction, the book becomes a software manual. Five chapters are structured as tutorials. The sample files are used all the way through, so you regularly get to see graphics on your screen. About half of the book is devoted to a reference manual on the POV-Ray language and objects.

The package is supported on CompuServe (GO GRAPHDEV). Program upgrades and sample files are available there.

Michael Aitken

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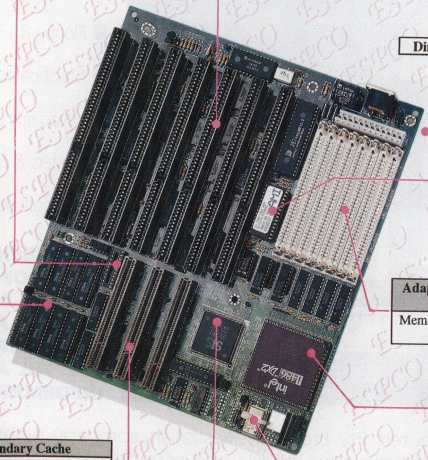
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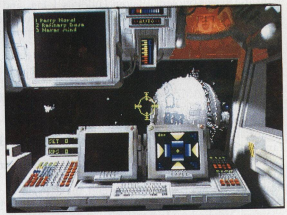
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Privateer

BY NATHANIEL TUNBRIDGE

Wing Commander's universe gives rise to a new way of making toast.



At last it's here, and even better than we imagined! Origin's welcome return to deep-space combat is set in the same universe as the Wing Commander series, where the Kilrathi/Confederation war rages and pilots are made into heroes, villains, or, more commonly, toast. Rather than continue the plot of WC, Origin has started a new story: a young man inherits his Uncle's small, Tarsus-class starship, and, rather than fighting against the encroaching furball threat, tries to make his way in the universe by transporting and trading goods, taking on bounty missions, or running contraband, exploring the seedy side of the Universe in the process.

There I was in the cavernous main concourse of the agricultural planet, Helen, in the Troy system of Humboldt Quadrant, in Gemini Sector. Through one door I could see the launch pad currently occupied by my little Tarsus, the interstellar equivalent of a 1979 Honda Civic. Nearby was the Commodity Exchange, where I could buy and sell goods. A little further up was the bar, a seething den of scum and gossip. Between these two entrances was the Mission Computer, which lists the missions currently available for pilots such as myself. The two alternatives to the mission computer are in the offices upstairs. The Mercenary Guild and Merchant's Guild cater to those pilots who prefer to work in the killing business or cargo business, respectively. For a small fee, they would provide me with more missions, but I found the Mission Computer adequate. At the end of the concourse I discovered the Ship Dealer. Here I could buy new equipment, or repair the stuff I had. He also had many weapons! (eight types of gun, two types of missile launcher, five types of missile, nine types of scanner, etc). But before I could buy all these fun playthings, I needed money.





So I accepted a mission to run guns to New Constantinople.

This proved to be a double mistake. Firstly, New Constantinople was in another quadrant entirely, and even to leave my system would require a jump drive (10,000 credits). Secondly, running guns is illegal. As soon as I left Helen's atmosphere, the Milita appeared on my little vid-screen. "Maintain speed and course" one of them commanded, "searching for contraband." Later I discovered I could quickly eject my cargo to avoid detection, but at the time I had no idea. Having detected my guns, the police proceeded to blast me to pieces. Clearly I had a lot to learn.

And learn I did. Firstly I had to get myself some serious guns; the single laser that came with the ship was hopeless. I took the manual's advice and set up a lucrative run; buying grain at the agricultural planet Helen to sell at the Mining base Achilles. Soon I had enough money to buy . pair of Neutron guns and a torpedo launcher. With these weapons I could take on bounty hunter missions, checking through Troy's five Nav points to ensure they were clear of pirates, Kilrathi and Retros (violent religous Luddites opposed to technological advancement).

Soon I had enough money to buy a Jump drive, which opened the rest of Gemini up for exploration; planets such as the filthy Blade-Runneresque New Detroit and the University planet Oxford, space stations such as Gemini's capital, New Constantinople, or the military base Perry. There were also refineryes, which I was able to add to my little circuit.

Privateer has the same addiction level as WC 2; it's impossible to stop playing! Its depth is astounding, its execution staggering, and its playability incredible, and it represents significant progress from WC2 in that it offers the player much more involvement and interaction with the environment. I was able to act as an honest merchant, or I could turn pirate, blast one of my fellow merchants, and steal his cargo with a tractor beam. Clearly, Han Solo had more fun than Luke Skywalker. Essential.

Privateer
Distributor: Electronic Arts
Telephone: (075) 911 388
Price: At dealers' discretion

Betrayal at Krondor

Distributor: Sega/Ozisoft
Phone: (02) 317 0000
Price: $99.95

This is a spirited adventure-style game, set in the Riftwar universe made popular by the fantasy novels of Raymond E. Feist. Dynamix has worked closely with Mr Feist to try and provide gameplay that is as realistically fantastic as possible. To this end, the designers have divided the action into chapters. Although it's fairly easy to wander around independently, I found this system still had a rather dictatorial effect, as though I was being encouraged to follow an already set plot.



The game boasts 2500 frames of rotoscoped animation, taken from live actors. Each character is capable of improving their skills, such as defence, accuracy (in a number of combat situations), assessment, weaponcraft, armorcraft, barding, haggling, lockpicking and so forth. Each of these skills is rated in percentage terms, and each time it is practiced successfully (for instance, managing to pick a lock), the appropriate skill is increased. As well as skills, each character has the generic set of Ratings: health/stamina, strength and speed. There are many different weapons and objects to be used, and the manual claims 224 million square feet of space have been set out using Dynamix's 3Space technology, to create a 'virtual fantasy universe'.

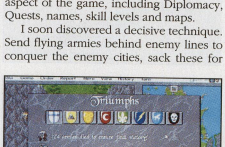
This one didn't grab me. It's essential for Feist fans, and the averge gamer should also check it out since it has a lot to offer, but personally I found it hmmm.
Nat Tunbridge

Warlords II

Distributor: Directsoft
Phone: (02) 489 7853
Price: $89.95

What a brilliant game! Warlords II will delight fans of its predecessor, and surprise people who are new to the series. Set in the fantastic land of Etheria, Warlords 2 has the same strategy framework as the first game, but the AI routines have been extended and the game has a much better look and feel. The aim is domination. Representing the kingdom of Nightmare (black outfits, red lining, skull symbol — very tasty) and starting from a single castle, I set out to conquer the surrounding neutral cities and, later, other kingdoms. Once a city had been conquered, it could commence production of more Nightmare units, be they Infantry, Cavalry, Archers, Giants, Spiders, Griffins, Devils, Demons . . . thirty different army types awaited construction! There are five different maps to choose from, and eight different armies. Any combination of player/opponent is possible, and there are definable options regarding almost every aspect of the game, including Diplomacy, Quests, names, skill levels and maps.

I soon discovered a decisive technique. Send flying armies behind enemy lines to conquer the enemy cities, sack these for



many gold pieces, then raze them to the ground! I thought this was fun, although the other players disagreed — they ganged up and killed me.

Warlords II is the most enjoyable and playable strategy game I've ever seen, and it was created, designed and produced right here in Australia. (And that means the buck stops here.) Essential.
Nat Tunbridge

Wayne's World

Distributor: Sega/Ozisoft
Phone: (02) 317 0000
Price: $89.95

Two great games! Can it continue? Well, no. Wayne's World is one of those spin-off-type computer games that seem to get pumped out as a logical accompaniment to any 'youth' film. The hopeless Home Alone games are another example, and, ominously, WW comes from the same company, Capstone.

For those unfamiliar with the plotline, I suggest you remain that way. The game begins with a tediously long sequence of very poorly-rendered video footage, which tries to introduce the game's plot — that is, that Wayne and Garth need $50,000 to prevent their show from being taken off the air. The solution seems to be a 'pizza-thon', and with that brief, one is plunged into the game.

Wayne's World works on the action-then-object point-and-click-style interface, where you click on one of the bottom row of icons to choose a particular action (look, touch, use, talk, etc) and then click somewhere onscreen to make the character perform the action to that object or person. Rather than have the player come up with their own ideas, five different sentences or actions appear at the bottom of the screen to be chosen from. Unfortunately, only one of these will result in any headway being made in the game, the others just elicit stupid, repetitive responses from the people around you, so there's no free choice.

Despite the 'No Hurl Guarantee' printed on the box, I would humbly suggest that, quite to the contrary, wasting your money on this game would elicit a response not unlike vomiting; you'll spew. Avoid.
Nat Tunbridge

Dinosaurs

Distributor: Microsoft
Telephone: (02) 870 2200
Price: $115

Jurassic Park has launched a wave of dinosaur-based marketing. For the digitally minded, there is a Dinosaur forum on CompuServe. Other spin-offs include the Jurassic Arts and Microsoft Dinosaurs CDs.

When you load Dinosaurs, your screen turns a tasteful prehistoric sepia. Its pages have a parchment look. Based on a series of books from Dorling Kindersley, the package has all the navigation features you would expect from a Microsoft Windows CD-ROM. It installs to an optional 2-4M of hard disk space, and runs under the Mulimedia Viewer application.



You drive the program by touching hot spots on the screen. The rock-shaped buttons on the contents page open a dinosaur atlas, a timeline, dinosaur family trees, guided tours of the dinosaur world, and mini dino-movies.

As with other CDs (notably Cinemania), it is easy to jump at whim from place to place by pointing and clicking on the hot screen. You can borrow dinosaur images as BMP files, and install a dino screen saver. The short animations are fun, but shouldn't worry Spielberg.

There's plenty of material here. The 16 spoken guided tours are chatty and informative. Designed for a general audience, this CD should appeal both to children and adults. The index is adequate, but doesn't support word search. The package's look and feel fits the subject well.

This stylish CD will help feed your dinomania.
Michael Aitken

Halloween Harry

Distributor : Manaccom
Phone: (07) 368 2366
Price: $49.95

Another sequel, and another all-Australian effort! But Halloween Harry differs from Warlords in that it caters, very successfuly, to a platform/arcade market. Harry comes equipped with a jet pack (thus negating any need for all that tedious ladder climbing so prevalent in platform games), which he can use to zip around the corridors of the game's four scenarios. He also comes equipped with a flamethrower, which runs off the same fuel as the jet pack. Obviously this necessitates auxillary weapons, and these can be attained from the coin-op machines that are scattered around the place. But he needs money, and money indeed can be found, but only through death! Killing the assortment of various drooling mindless zombies that populate the terrain brings in coins. There are also secret doors, and levers that reveal new passageways, and bimbos and scientists who must be saved!

Graphics are of the smooth-scrolling foreground/background style, and are very nicely done. The mutants explode nicely, spreading gore over a wide area, or flaming briefly when touched by the liberating fingers of napalm. Sound was written by Steven Baker (ABC's Young Composer of the Year), and even over a humble Sound-Blaster card, the music is stunning, sounding more like a CD-ROM with shrieking guitars and John Bonham's snare drum.



This is a great product from an exciting Australian team, who have secured Apogee as its American distributor. Yay team! Highly recommended.
Nathaniel Tunbridge

Return To Zork

Distributor: Activision
Phone: (02) 809 4444
Price: $99.95

The next generation of classic adventures makes its triumphant debut! *Return To Zork* is an amazing interactive adventure of danger, intrigue and low cunning. Filled with fascinating puzzles, it features a cast of Hollywood stars, a revolutionary interface, over an hour of spoken dialogue and an enchanting musical score.



The story is set high on a mountain top where you are an unwitting traveller, armed only with a tape recorder, camera, map and the essential pen-knife. With the help of a Tele Orb (a personal crystal ball) you discover that the valley below — formally known as The Valley of the Sparrows — has had a name change and is now referred to by locals as The Valley Of The Vultures. Nevertheless, you soldier on and upon arriving at the lighthouse relax slightly as the doddering old lighthouse keeper attempts to make you tell him the password — but realises that he himself can't remember it. After receiving some dubious advice from him you make your way to West Shanbar to find it void of nearly all people. All that is, except for a school teacher, an inebriated town drunk and the Major, who is overly excited at your arrival as it means potentially another very needed vote.

Columbo-style questioning and a thorough investigation of the town reveals that the Illumynite, Translumynite & Leisure Incorporated Company (IT & L, Inc.) was formed by the wizard Trembyte, Rooper, Moadikum Moodock and the mage Conuk, for the purposes of building an underground resort and for the development of high technological commercial products.

However, you soon discover that all did not go as to plan: people have vanished, buildings have disappeared — and it is your destiny to collect all the clues and secure the underground empire from the forces of evil.

How this is done I'll keep as secret, but suffice to say I found the game very addictive — as indeed did a series of afternoon visitors who soon became overnight borders. To play the game, you'll need a CD-ROM, VGA, hard drive and minimum 386.

RTZ is one of the best adventure games I've played. The story is detailed and the characters, although fictional, take on a real appearance due to the amazing cinematic quality of live footage. A real pleasure to play.
David Mitchell

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Double-*oh*, Double-*five*, Double-*pay*?

BY STEPHEN WITHERS

Is 0055 really the convenient way of getting information or just a revenue raiser?

I've always been sceptical about 0055 services. Too many of them struck me as being a way of asking me to pay to listen to advertising. If someone wants to sell me something, I don't mind paying for a local call to find out more, but that's about as far as I'll go. (I never understood why Telecom made 008 calls completely free to the caller, but that's another story.)

Even where 0055 numbers offer genuine information, not even the government can resist the temptation to pad the messages so you have to pay more. If you timed the length of the Australian Bureau of Statistics' message giving the latest CPI figures for income tax purposes, you'll know that it went into the second charging unit. The message could easily have been given within 10 seconds.

And what about the ABC's Backchat viewer-feedback programme? They expect *me* to pay *them* for the privilege of passing comment on their output? Get real!

I'm also suspicious of competitions on 0055 numbers. A fixed-price call of up to 50 cents is — at one level — okay, because that's roughly what you'd pay for a stamp and envelope. But when part of that charge goes to the organiser of the competition, I can't help wondering if it isn't really a form of gambling, as the organiser's cut can easily cover the cost of the prizes, with some left over as the 'house percentage'. Instead of the organiser putting up the prizes in the hope of showing a profit from additional sales of whatever is being promoted, we have a situation where the losers pay for the winners' prizes. If that's not gambling, what is it? (In case you're wondering, I don't have anything against gambling, I just expect it to be honest and open.)

Anyway, enough of the soapboxing — you're probably wondering what this has got to do with communications and bulletin boards. Well, we are starting to see bulletin boards using 0055 numbers. The one I saw advertised charges 35 cents per minute, and only supports speeds up to 2400bps. That's $21 per hour.

Let's put that in perspective. I'm currently a financial member of two bulletin boards. I pay one of them $25 per year, and that gives me access to well over 2G of files plus the usual network mail facilities. I'm allowed two hours' access per day, and I can connect at up to 14,400bps (when someone lends me a fast modem!), giving me something like six times the throughput. If I use the system once a week for half an hour at a time, that's 1.6 cents per minute. Allow for the greater throughput of 9600bps, and we're talking about the equivalent of 0.4 cents per minute, or almost one-ninetieth of the 0055 rate. I pay a little more to the other board, but it does give me access to a wider range of Internet newsgroups. It also has some disadvantages, which is why I use two boards.

Admittedly, CompuServe charges start at 45 cents per minute, but that service is in a completely different league, and includes a unique communications channel between users and vendors.

I guess there are people who will pay a premium price for fairly ordinary products. In a more-or-less free market, someone will take advantage of that fact.

Austel approval

After what appeared to be a squeaky-clean period, modems without the necessary Austel approval are being promoted again. Since the fine for connecting unapproved equipment to the phone system can run into five figures, I personally wouldn't risk it. According to an Austel official, there is nothing you can do to an unapproved modem (apart from getting it approved) to make it legally connectable to the phone system, even if the connection is made via another device.

I can't really understand the temptation to buy unapproved modems, especially when one of the Editor's Choice modems in *APC's* September review of fast modems costs less than $500. I suppose there is sometimes a period when a new class of device has gone on sale in the US but hasn't reached these shores. The most recent example would have been modems that support voice mail. These started selling in Australia a few months ago, about a year after they first appeared in the US.

Does anyone in this country operate a private phone network that doesn't connect to the public system? If not, unapproved modems can't be used legally, so why is their sale permitted? It still seems strange to me that once a vendor has specified that the modem or other device isn't approved, it has fulfilled its obligations and can happily and legally profit from any sale.

Satellite service

In the July column, I mentioned a US BBS magazine called *Boardwatch*. The most recent issue I have seen contained news of a great idea: news feeds via satellite. American sysops can buy a satellite dish and decoder, then receive all those megabytes of messages without tying up a phone line for hours on end. If I remember correctly, the price of the hardware is something like a couple of thousand dollars, which includes the first year's subscription. Spread that between 100 users, and it looks quite affordable. Who knows — one day there might be enough satellite channels and potential users to extend the service to our region.

Anniversary

This issue marks the end of my tenth year of writing about bulletin boards and related matters for *APC*, although my association with other areas of the magazine goes back even further. A lot has changed over the decade, so next month I'll celebrate the anniversary with a review of the history of BBSs in Australia.

NEW Systems

Australia Wide

CyberNet 0055 39196. P. Tarquinn Watson. V.22, V.22bis, V.32. FidoNet 3:632/518. 24 hours.

NSW

2001 Computers BBS (02) 413 1555. M. Simon Assouline. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:711/506. 24 hours.
Absolute Zero (02) 743 3890. P. Filipe Rodrigues. V.22bis. 9pm-9am daily.
ADDICTED! (02) 829 3120. P. Darryl Goodwin. V.21, V.22, V.22bis, V.23, V.32, V.32bis. 9:30pm-6:30am daily.
Curly BBS (02) 554 9430. P. Steven Thurston. V.21, V.22, V.22bis, V.32, V.32bis. 24 hours.
Scorpian BBS (02) 300 9141. P. Alexis Banas. V.21, V.22, V.22bis. 8pm-8am daily.
The Fields (02) 618 3532. M. Anthony Webster. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:712/509. 24 hours.
The Hills BBS (02) 484 4890. MV. Stan Krzeminski. V.21, V.22, V.22bis. FidoNet 3:711/811. 10pm-6am daily.
TRIODE (02) 389 8790. P. Paul Black. 24 hours.
Cocky's Place BBS (046) 83 1431. P. Dennis Toye. V.21, V.22, V.22bis, V.32. 9pm-3pm daily.
EDUCATE BBS (043) 53 2163. MV. Greg Davidson. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:711/447. 24 hours.
Mustang's BBS (044) 23 4143. P. Chris Muller. V.21, V.22, V.22bis, V.32. 24 hours.

Vic

Answers BBS (03) 380 8458. MV. David Jones. V.21, V.22, V.22bis, V.23, V.32, V.32bis. 10am-midnight daily.
BiNAry 2 BBS (03) 592 2402. P. Lyle Pakula. V.22bis. 24 hours.
Night Owl Theatre (03) 802 2332. P. Laurie Miles. V.22bis. FidoNet 3:635/716. 11pm-7am daily.
Party Zone BBS (03) 314 1098. P. John Mcclumpha. V.21, V.22, V.22bis, V.32, V.32bis. 24 hours.
Ranger's BBS (03) 749 6148. V. Ranger Dave. V.22bis, V.23, V.32. 24 hours.
The Underground BBS (03) 754 3060. P. The Underground Master. V.21, V.22, V.22bis, V.32, V.32bis. 24 hours.
Gateway BBS Support Site: (060) 59 2650. P. Steve Bergman. V.22bis, V.32, V.32bis. FidoNet 3:621/502. 24 hours.
Majical Kingdom BBS (054) 27 2104. P. Tim Smith. V.22bis, V.32, V.32bis. 24 hours.
Satans Domain BBS (051) 76 1402. P. DeAtH iNcArNaTe. V.21, V.22, V.22bis, V.23. 9pm-7am daily.

Qld

Amiga Expansion BBS (07) 269 8924. MV. Andrew Kendall. V.32bis. 24 hours.
Dead Lights BBS (07) 368 3567. MV. Xiron. V.21, V.22, V.22bis, V.23, V.32. 24 hours.
Liquid Metal BBS (07) 812 2324. P. Andrew Fort. V.22bis, V.32, V.32bis. FidoNet 3:640/214.100. 24 hours.
Melt Down BBS (07) 847 2318. P. V.22bis. 9pm-7am daily.
MIDAS-Net (07) 204 0399. MV. Laurie Walkear. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:640/253. 24 hours.
Power BBS (07) 821 1067. P. Chris Prasser. V.22bis, V.32, V.32bis. 24 hours.
Wonderland BBS (07) 300 6164. P. Michael Watkin. V.22bis, V.32. 24 hours.
ACME BBS (076) 97 1329. MV. Denis Markwell. V.21, V.22, V.22bis, V.23, V.32, V.32bis. 24 hours.
Action Online (075) 76 7168. MV. David Caune. V.21, V.22, V.32, V.32bis. 24 hours.

SA

Knight Rider (08) 252 3226. P. John Knight. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:800/884. 24 hours.
R&D BBS (08) 269 6499. MV. Ron Conron. V.22, V.22bis. FidoNet 3:800/844. 24 hours.

WA

Blood Suckers!!! BBS (09) 382 1939. MV. Salem and the Hitman. V.21, V.22, V.22bis, V.23, V.32, V.32bis, HST. 24 hours.
OZmosis (09) 490 3430. MV. Tracey Henderson. V.21, V.22, V.22bis. FidoNet 3:690/674. 8pm-8am daily.
Psychosis BBS (09) 356 5269. V. Gareth Sampson. V.22, V.22bis. 24 hours.
Stellar BBS (09) 474 3389. M. Frank Ray. V.22, V.22bis. 24 hours. **The Sound Barrier** (09) 245 1332. MV. Graham Butler. V.21, V.22, V.22bis, V.23. 24 hours.

Updates

NSW

Aaron the Aardvark BBS Temporarily offline.
Amiga Action BBS Permanently offline.
ATAA BBS Possibly offline.
Avantgarde BBS (02) 358 1177 Multi-Line. P. Marx Wegener. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:712/401. 24 hours.
Big Whopper BBS (02) 622 2148. MV. Andrew Maggs. V.22, V.22bis. FidoNet 3:713/501. 24 hours.
Cool Guys' Corner BBS Permanently offline.
Home Computing (02) 985 7806. M. David Ready and David Sainty. V.22, V.22bis, V.23, V.32. FidoNet 3:711/455. 24 hours.
Microsoft Download Service (02) 878 5200 Multi-Line. MV. Martin Davies and Karren Rawas. V.22, V.22bis, V.23, V.32, V.32bis. 24 hours.
MMC-BBS Permanently offline.
NET-TECH BBS See TRI-TOWER BBS.
New Generation BBS Permanently offline.
Ocean Data BBS Possibly offline.
pos Permanently offline.
Shadowland BBS Permanently offline.
Substation Zero (02) 831 8040. P. Captain Zero. V.22, V.22bis, V.23, V.32. 24 hours.
The BeeHive BeeBS Permanently offline.
The Final Frontier BBS Permanently offline.
The Megalink Host System Possibly offline.
The PC Direct BBS Possibly offline.
The War Room BBS (02) 971 2132. MV. Steve Jones. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:714/402. 24 hours.
TRI-TOWER BBS (02) 633 3216. MV. Bob Fryer. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:713/814. 24 hours.
Windy Willows. The Haunted BBS (02) 821 4952 Multi-Line. MV. Joanne Goff. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:713/617. 24 hours.
Abacus BBS (065) 47 2923. P. Barry Smith. V.21, V.22, V.22bis, V.32, V.32bis. 9pm-7am daily.
Christianity Out West BBS (068) 62 5145. MV. Mark Livingstone. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:623/680. 24 hours.
Computec BBS Possibly offline.
Computing Out West BBS See Christianity Out West BBS.
The Fume Cupboard (049) 42 2067. MV. Scott Mackenzie. V.22, V.22bis, V.32, V.32bis. FidoNet 3:622/402. 24 hours.
The Midnight Caller BBS (047) 22 2149. MV. Kenneth Philliponi and Bob Rayner. V.22, V.22bis, V.32, V.32bis. 24 hours.

Vic

Alternative Access BBS (03) 576 1507 Multi-Line. M. Michael Bate. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:632/502. 24 hours.
Bards Realm BBS (03) 583 2926. P. Steve Lockwood. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:634/397. 24 hours.

Danger Zone Permanently offline.
Gilligans Island BBS (03) 689 1255. MV. Colin Iliffe. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:633/367. 24 hours.
MilSim Permanently offline.
The Contact Point See Gilligans Island BBS.
The Flying Circus/Gummi Glen (03) 888 8846. P. Foolish Jesture and Avatar. V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:635/555. 24 hours.
ValleyWare BBS Searchlight Sales/Support Permanently offline.
CYBER BBS Permanently offline. **Dynamic Dudes BBS** Permanently offline.
Latrobe Valley BBS (051) 76 1571. V. Darren Crick. V.21, V.22, V.22bis, V.23, V.32. FidoNet 3:632/321. 24 hours.

ACT

ShockWave BBS (06) 241 4210 Multi-Line. MV. Daniel Segeri. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:620/257. 24 hours.

Qld

Albatross See Data Tech BBS.
Data Tech BBS (07) 398 7038. P. Ryan Murphy. V.21, V.22, V.22bis, V.23, V.32, V.32bis. 8pm-6pm daily.
Lowtech BBS (07) 814 0505. MV. Alan Low. V.22, V.22bis, V.23, V.32. FidoNet 3:640/814. 24 hours.
RAMTECH BBS (07) 356 5079. P. David Saltrick. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:640/214.1. 24 hours.
The Dream Machine Permanently offline.
The Lian's Den Permanently offline.
The Linenoise BBS (07) 800 0016. MV. Stuart Boneham. V.21, V.22, V.22bis, V.23, V.32, V.32bis, TrailBlazer. 24 hours.
The Trek BBS Possibly offline.
ZYGOnet! BBS Possibly offline.
Dragnet OS/2 BBS Permanently offline.
The Dead Zone BBS See The Rebellion.
The Rebellion (075) 32 6461. P. David Ruddock. V.22bis, V.23, V.32, V.32bis. FidoNet 3:640/940. 6pm-9am weekdays, 24 hours weekends.

SA

Adelaide Mailbase Permanently offline.
Alternate Reality Temporarily offline.
IMAGE SYSTEM BBS (08) 265 0063. P. Matt Rains. V.21, V.22, V.22bis. FidoNet 3:800/819. 24 hours.
The Realm V Permanently offline.

NT

Co-Pilot BBs Darwin Permanently offline.
Kakadu Konnection (089) 48 0068 Multi-Line. MV. Tom Koltai. V.21, V.22, V.22bis, V.23, V.32, V.32bis, TrailBlazer. FidoNet 3:850/111. 24 hours.
Red Centre Amiga Possibly offline.

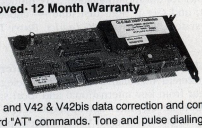
WA

Ant's File Factory BBS Permanently offline.
Bassline BBS (09) 306 4854. V. Alistair Maxwell. V.22, V.22bis, V.32, V.32bis. FidoNet 3:690/744. 24 hours.
Cybernet See Bassline BBS,
Cyclonic Tower BBS (09) 316 3892 Multi-Line. MV. Karl Ferguson. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:690/362. 24 hours.
Razor Board W.A BBS Permanently offline.
Spectrum BBS Permanently offline.
The Electrical Connection BBS Permanently offline.
The Sentinel BBS Possibly offline.

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Conferences/Meetings

November

10 & 24 **Multimedia User Group** This group meets every second and fourth Wednesday of the month at the Mount Waverley Community Centre, Melbourne. The meetings enable members to discuss any difficulties and help each other in specific areas of expertise. Other benefits in being a member include: monthly newsletters; access to cheaper commercial hardware and software; and a place to buy, swap or sell your computer components. *Enquiries, Andrew Barfoot, tel: (03) 758 4822*

11 **Sydney PC Users Group Desktop Publishing Special Interest Group** This group meets on the second Thursday of each month in the Bowlers' Club of NSW, 95 York Street, Sydney, at 6pm. Topics for this month include: Save money — talk to your printer first, and Get it right first time — choosing a desktop publishing system. *Enquiries, SIG Leader, Barry Tucker, tel: (02) 360 1393*

15-16 **ATM '93 (Asynchronous Transfer Mode)** This premiere Australian event will give delegates the opportunity to hear from key international and local speakers on the standardisation, development and application of ATM technology and the impact it will have on your business processes. It is a two-day event taking place at the Sydney Renaissance and will also give delegates the opportunity to discuss the latest issues in the development of ATM technology. *Enquiries, IIR Conferences, tel: (02) 954 5844*

18-19 **Client/Server Computing** This conference at the Hotel Nikko Sydney, Potts Point, will include topics such as: How to evaluate the costs and benefits of client/server and its applications in your organisation; Client/server network architectures — what are the options?, and Strategies for adding value to the client/server environment. An optional one-day preconference workshop will take place on November 17, providing a practical, hands-on approach to client/server development tools. *Enquiries, IIR Conferences, tel: (02) 954 5844*

25 **Australian Windows Users Group (Victorian Chapter)** This non-profit self-help group, with a membership of 250, meets on the last Thursday of each month. Victorian meetings are held at 7/468 St Kilda Road, Melbourne. *Enquiries, Stephen Moignard, tel: (03) 532 0684*

29-30 **Telecommunications Pricing and Cost Control** This conference aims to explain the regulation and role of price control and tariffing in a competitive environment and the safeguards for the consumer. The major carriers and service providers will also be present to answer any questions and address participants' concerns at this two-day conference, which will be held at The Golden Gate Hotel, Sydney. *Enquiries, IIR Conferences, tel: (02) 954 5844*

29-30 **Installing and Maintaining Networks** The object of this seminar is to make it possible for delegates to diagnose and resolve networking problems, whether they be hardware, software, operating procedures or transmission failures. The subjects covered are generic, and apply to all forms of Local Area Networks, irrespective of the type of hardware, software, cabling, etc. *Enquiries, MTE Management Technology Education, tel: (03) 629 5811, (02) 261 5555, (07) 221 3611*

November/December

28-1 **ACOFT-18 '93** This is the 18th Australian Conference on Optical Fibre Technology which includes all fundamental research, development, production application and business strategies of optical fibres, waveguides, sources, detectors and other services for the telecommunications and sensors industries. Tutorials and workshop sessions will be offered to ACOFT attendees who wish to strengthen or expand their backgrounds in optical fibre technology on Sunday, November 28. *Enquiries, Conference Secretariat, tel: (02) 327 4822*

Exhibitions

December

3-5 **The Home Computer Show** This is the 3rd Home Computer, Software, Education & Entertainment Exhibition which will be held at the Royal Exhibition Building, Melbourne. It is a show for all the family with major computer names all under one roof. *Enquiries, Australian Exhibition Services, Chris Murray, tel: (03) 867 4500*

16 **High-Tech '93** This is an exhibition that will provide valuable information to a wide interest group, from architects, CAD designers and software developers to utility engineers. To complement the exhibition there will be a symposium taking place in Sydney. *Enquiries, ACADS, tel: (02) 299 5406*

Training

November

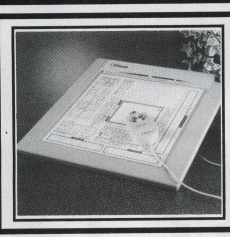
15-16 **Diagnosing and Solving Printing Problems** This two-day hands-on course in Melbourne includes topics such as: Overview of the printing system; Printing technology; Software environments; The data transfer environment and Problem diagnosis. Each section of this course is followed up by practical instruction. *Enquiries, IIT Training, tel: (02) 959 5990*

10-12 **Network Cabling Design** This hands-on course enables participants to learn the cabling essentials and understand Australian trends including: Cabling cost estimate techniques; Who sets cabling standards and regulations and why; and Correct copper and fibre optic cable termination and testing. *Enquiries, IIT Training, tel: (02) 252 2844*

22-23 **Writing Manuals, Documents & User Guides** Participants will be given professional skills which will guarantee improved writing techniques and a methodology will be introduced to guide delegates through all the necessary stages. Canberra is host to this seminar, and a repeat presentation will be held in Sydney from November 29-30. *Enquiries, MTE Management Technology Education, tel: (02) 261 5555, (03) 629 5811, (08) 231 3048 and Brisbane (07) 221 3611*

Diary Data is compiled by Helen Summers, tel: (02) 288 9123. For inclusion in this section, fax details of your upcoming conference, meeting, exhibition or training course to Helen on (02) 267 4903, or by email to HSummers%6542840@mcimail.com

MicroGram Computers



Digitiser

- Essential for serious CAD work and applications where a mouse would normally be used.
- 12"x12" or 18"x12" Digitiser emulates a number of popular digitisers, including a user defined option.
- Will also emulate MS and PC mouse.
- Up to 1500 LPI resolution
- Templates for AutoCAD 10, 11 & 12 are included.
- Also includes 4 button cursor.
  - Part No. 8142 12"x12" Digitiser $393.00
  - Part No. 8185 18"x12" Digitiser $957.00

Loopback Plug Set

- Consists of one DB9 female, one DB25 female and one DB25 male loop back plugs.
- Designed to test serial and parallel ports with programs such as Norton Utilities 7.
  - Part No. 15023 $25.00

Parallel Data Transfer Cable

- Allows data transfer between computers via parallel ports.
- Can be used with programs such as DOS 6 Interlink, Laplink or Norton Commander 4.
  - Part No. 9044 $30.00

Bubble Jet Refill Kits

- Kits includes two refills.
- Twice the ink for half the cost of a single cartridge.
- Suitable for Canon BJ 10e, ex, sx, Apple Style Writer, Star SJ-48 and Brother HJ-100i.
  - Part No. 5140 $25.0

16550 UART with FIFO's

- A direct replacement for the 16450 and 8250 in character mode.
- Includes 16 byte buffers on transmit and receive in FIFO mode.
  - Part No. 8127 $31.00

Remote Access Server Card

- Novell WNIM+ compatible adapter.
- 8 RS232 asynchronous ports.
- Up to 2 adapters per system (16 ports)
- 80186 CPU for high performance.
  - Part No. 2207 $1244.00

VL Bus SCSI, IDE, Serial, Parallel

- Onboard CPU
- Onboard 64Kb High Speed FIFO
- 10MB/S fast SCSI-II transfer rate.
- Supports up to 56 SCSI devices (up to 8GB for DOS).
- Supports 2 IDE drives.
- Supports 4 floppy drives (up to 2.88)
- 1 parallel port, 2 serial ports.
  - Part No. 2201 $499.00

Industrial Control Card

- Provides 8 I/O Ports
- Each I/O Port Includes 8 Digital I/O Lines
  - Part No. 17002 $131.00
- Supports the following expansion Boards.
  - 8 Channel Relay Output. 8 Channel Opto Isolated Input.
    - Part No. 17003 $303.00
  - 8 Logical output. Up to 8 Channel SSR with LED Indicators.
    - Part No. 17006 $242.00
    - DC SSR Part No. 17008 $37.00
    - AC SSR Part No. 17009 $53.00
  - 16 Channel Relay output
    - Part No. 17004 $272.00
  - 16 Channel Opto Isolated Input.
    - Part No. 17005 $257.00

Video Grabber

- Freeze live video images & save as BMP, PCX, TIFF file.
- Resizeable image window.
- Operates under Windows 3.1
- Three software selectable video sources.
  - Part No. 3103 $549.00

Broadcast Quality VGA to Video

- Display your computer VGA output on a TV or record on a VCR.
- Ideal for training rooms etc.
  - Part No. 3068 $1178.00

TV Tuner Card

- Provides Video and Audio signals as source for Monitor TV Card, Video Grabber Card, Sound Card etc.
- Channel selection software runs under DOS and Windows.
  - Part No. 3092 $177.00

Teletext Card

- Full colour teletext display on VGA, EGA screen.
- Captures 100 pages on each transmission cycle for display.
- Captured pages can be written to disk for later processing.
- Programming interface included.
  - Part No. 3096 $736.00

CCD and Wand Bar Code Readers

- The latest technology has allowed the decoder to be integrated into the body of these bar code readers.
- A simple In-line Plug/socket connects the bar code reader between the keyboard and the computer.
  - Part No. 8193 Barcode Wand Keyboard wedge $445.00
  - Part No. 8196 CCD Scanner Keyboard wedge $639.00

4 or 8 Port RS232 Multiplexer Card

- Provides 4 or 8 RS232 ports multiplexed onto 6 core telephone cable.
- A demultiplexer box with 4 or 8 DB25 connectors may be located up to 500m from the computer.
  - Part No. 2205 4 Port Multiplexer Card & Box $466.00
  - Part No. 2206 8 Port Multiplexer Card & Box $514.00

Diagnostic Cards

- Find motherboard problems *FAST*.
- The POST error code is displayed on a LED display.
  - Part No. 3018 Made in Taiwan $152.00
- LED's indicate BUS voltage levels.
- Includes Logic Probe
- In excess of 160 pages of valuable technical information in the manual.
  - Part No. 3061 Made in USA $499.00

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- Designed to replace the current generation PC (PS/2 style) power supply.
- Rated output of 220 watts provides ample current for additional/bigger hard drives & CD ROM drives.
- A temperature controlled regulator varies the speed of the cooling fan in response to the ambient temperature and load current.
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- Designed to meet the requirements of the German FTZ standard to reduce EMI and RFI interference to an absolute minimum.
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- Suitable for POS, Industrial Control etc.
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- 32 Key Serial Port Connection
  - Part No. 8095 $131.00

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  - Part No. SI8255-1 $136.00

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- Ten models to choose from
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- Read EPROMS and save to disk.
- Read from disk and write to EPROM.
- Modify EPROM.
- Blank check.
  - Part No. 3001 Single burner to 512K $262.00
  - Part No. 3017 Single burner to 1M $348.00
  - Part No. 3038 Four burner to 1M $479.00
  - Part No. 3003 Eight burner to 1M $675.00
  - Part No. 3057 Single burner Serial to 512K $298.00
  - Part No. 3058 Single burner Serial to 4M $468.00
  - Part No. 3079 Single burner to 2M H/Spd $453.00
  - Part No. 3080 Single burner to 8M H/Spd $730.00
  - Part No. 3087 Four burner to 8M H/Spd $841.00
  - Part No. 3088 Eight burner to 8M H/Spd $1360.00

AT/386/486 Diagnostic Card

- Plug into motherboard expansion slot and switch on.
- Error code is shown on LED display indicating failure out of 59 possible tests.
- Where appropriate the manual indicates the area of circuitry and/or the suspect IC associated with the error code.
  - Part No. 3018 $152.00

Industrial Control Membrane Keyboard

- Standard PC compatible keyboard.
- Free standing or rackmounting.
  - Part No. 17012 $514.00

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- Allows up to 2 Gigabytes in one partition plus much, much more.
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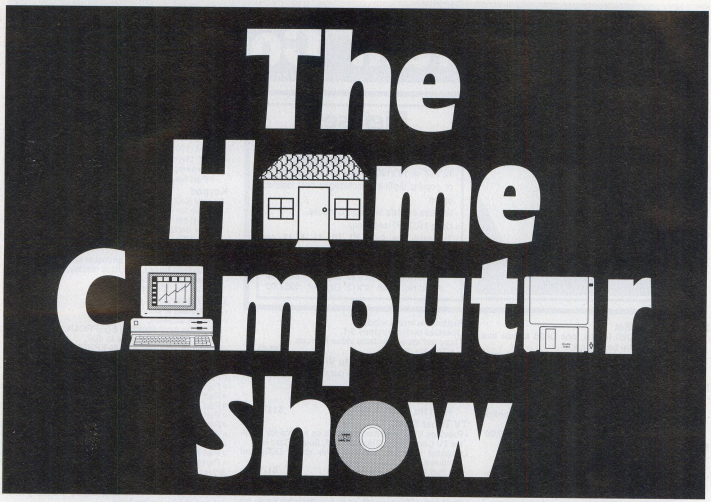
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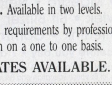
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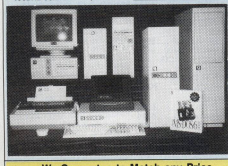
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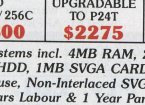
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Our gossip monger reports on: the first dead mouse in computer history, Microsoft's noses, baby mail, Apostrophe Man, and finally gets shot down in flames.

BY CHIP CHAT

Long before the first computer LAN came into being there were bugs in the communications infrastructure. We've all heard of sneaker net, but Chip Chat has the low-down on HooverNet.

Thom Fraser, co-founder of mail specialist, Beyond Inc, tells the tale of HooverNet, a suction-driven enterprise-wide pipe system for the routing of paper-based messages in metal capsules. HooverNet would deliver the messages in a linear fashion around the organisation, usually depositing the right message on the right desk, but offering no guarantees of timely delivery — today, tomorrow, this afternoon if you're really lucky. But no promises.

Then one day HooverNet stopped functioning — no suction, no message transport, no explanation. A comprehensive exploration of the pipe system uncovered — you guessed it — a deceased rodent, whose tiny frame was blocking the passageway, setting a precedent as both the first bug in the network and the first dead mouse in computer history.



Microsoft, long known for its reticence, has discovered a nose for news. The staff and corporate efforts towards raising money for SIDS research raised a very commendable $1500 in the sale of Red Nose Day paraphernalia, the wearing of noses and outrageous outfits.

Microsoft employees raised $500, for which the company contributed $2 for every $1. It's not the first time Microsoft employees have subjected their bodies to stress and ridicule in the name of charity.

Notable incidents include the time a large number of executives appeared shorn skin-head-style to raise money for the Salvation Army, and the recent endeavour by 65 Microsoft employees to complete the City to Surf, heavily sponsored by all their colleagues, (and anyone else in the industry who would give), which returned a sizable donation to the National Heart Foundation. Pictured, some of the aforementioned employees on one of the fund-raising escapades — but why didn't you send us a caption to tell us which event it was, guys?

And then there's the story of the senior vice-president for spreadsheets at the company that used to be a spreadsheet company but is now a communications company — we all know who we mean.

This proud Dad scanned an image of mother with new baby to mail to a few of his closest friends, but was tripped up by one of those ubiquitous 'everyone' mailing lists, and ended up accidentally broadcasting the happy family snap across the US and abroad. All together now, to the tune of the Toyota ad — Oh oh oh oh, what a phone bill!

Publishing nemesis and sub-editors' anathema, Apostrophe Man, must have visited the agency responsible for Microfax's PR during the night, spreading his nasty punctuation marks into unchecked press releases, because Chip Chat, and no doubt every other computer publication, received the following missive about Microfax's new release . . . "An

Gareth on the prowl

Well, good readers, here I am in Ulan Bator, somewhat sidetracked after I lost my Newton PDA in the Mongolian countryside. Oh the ignominy! I went to switch between my first and third trusty Windows laptops, but the wireless infrared connections between laptop number two and my Windows CarServer had broken down, and I became tangled in the wires which were used to replace them.

Such is the life of a roving Welsh Windows reporter!

Anyway, this little snippet leads me to tell you that I am actually going to complain this week, for a change, about the inadequate government regulation of the infrared wireless connections frequency system, which also played a role in my current disaster. I was updating my Windows Lotus Notes-supported Lotus Organiser for Windows from my Newton PDA, using an infrared connection, when lo and behold, I heard the following transmission: "Two Big Macs and a large fries, thanks," (in Mongolian. I speak Mongolian fluently, of course) as a staffer in Ulan Bator's only McDonalds sent an order through to the chefs. Just my Gallic luck! In the middle of the most desolate country on earth, someone else is using my frequency.

Anyway, this minor glitch caused the beam between my Newton PDA, running Windows emulation, to become jarbled, erasing the hard disk on my Windows CarServer. After rebooting the Windows CarServer (Intel Pentium-based, of course), I discovered my plight.

The screen remained dark (no doubt the sort of dark Jonah experienced in the whale. Did I tell you I rescued Jonah? Another time perhaps), and then a full-screen golden arch logo flashed in a blinding glorious light with the message, 'Welcome to Windows McInformation Highway'. And then in smaller text, on an half-obscured roadside placard, 'Drive slowly. Bill Gates shall sit in judgment, and the meek and dorky and those wearing glasses who drink too much Jolt shall inherit the earth'.

Well, the experience shook me, let me tell you. Here, as of now, I tell you that hereafter I will never mention Windows again. I'm going to stop raving about Windows and Windows for Workgroups and Windows NT and Windows Mobile and even my trusty Windows bar fridge.

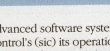
As a result of this horrid piece of egotistical bug notification programming, I can't even bury my poor goldfish and poodle (I trust you read my last column) as the aforementioned crash undid all my carefully wirelessly, Windowsly-organised funeral arrangements. I had to suffer the indignity of filling out paperwork here, in this God-forsaken Windows-less city, this technological Sodom and Glamorganshire so as to organise their rites of passage. Without so much as a Window in sight. The agony.

Time to reformat . . .

Wait, maybe I could just download my master system again via an infrared Windows connection through one of my Windows laptops from my Windows for Wang WangNet VS4000015 Super-Server which supports GarethNet for Windows. I'll tell you more when next we meet.

Gareth Prowell, who still insists on writing under the rather cutesy pen name of Dan Tebbutt, will be corresponding from Stanmore next week. Please note: Any similarities to any living person, particularly the editor of the Sydney Morning Herald's Computers and Communications section, are purely coincidental — honest.

advanced software system . . . control's (sic) its operations . . . " The product? A miniture (sic) fax modem. Tut tut, Apostrophe Man, tut tut.



A few potholes appeared in Bill Clinton's vision of a data highway the night he was to deliver his congressional speech on health care. Brit Hume from *The Washington Post Writers Group* tells the story of the techno-difficulties for presidential aides in bringing the president's speech to screen for him to deliver.

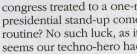
The president uses a pair of GRiD 386 laptop PCs running QCP Mark I large-type-generating software to run his speeches, the second as a back-up in case the first should stop at any point during the presentation. Computer failure was not the problem, however, when techno-Bill stood up to present the health-care speech.

There were two speeches on the diskette, the one he was supposed to give, and the February speech on the economy, called *The Way Forward*. In the scramble to start on time, the two files were merged into one as they were trans-ferred to the QCP software.

So it was that in a heart-stopping example of 'all-political-speeches-aren't-the-same-th ey-just-sound-that-way', the February version of the presidential vision began to spool out as Clinton stepped up to the podium.

Number one computer-driven aide David Dreyer came to the rescue, reselecting the required file onto a spare diskette, and re-sending it to the QCP software.

And in the meantime, was congress treated to a one-man presidential stand-up comedy routine? No such luck, as it seems our techno-hero had a paper-based copy of the speech in his pocket, which he used in the eight minutes it took for Dreyer to reload the speech and find the right place.

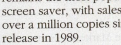


Berkeley Systems, creator of the famous flying toasters screen saver, is not impressed. It seems that California satirist and me-too software writer, Berkeley Breathed, has decided 'if you can't beat 'em, skeet 'em'. The Opus 'n' Bill screen saver, written for Toronto-based Delrina Corp, is the result. A series of comic-style animations, one of which features a penguin called Opus who takes pot shots at winged toasters as they fly across the screen.

Also in the software's satirical sights are White House first cat, Socks, Bill Clinton, and technology's more famous Bill (Gates). The sketches are based on comic strips published by Berkeley Breathed in various US magazines. Decorum dictates that Chip Chat refrains from delving further into detail.

Not surprisingly, Berkeley Systems has filed for damages, but Delrina denies that it is trying to profit from the success of the flying toaster icon, insisting that it has the right to satirise the computer industry in the same manner as cartoonists in any other field. There is little difference, he claims, between satirising in news and comics, and satirising in the medium of communications, except that it has never been done before. The sniping continues.

Meanwhile, After Dark remains the most popular screen saver, with sales of over a million copies since its release in 1989.



APC receives all sorts of queries, but this beats most of them. Last week, a colleague who shall remain nameless took an enquiry from a caller wanting to know the phone number for the distributors of After Dark. After providing the information, the colleague asked the caller if he had ever heard of the *Software Buyers Guide* — (having graduated from the Microsoft School of self-promotion). The caller responded that it sounded like a fine idea, but would be no use to him, since he was blind. Which brings us to the question of why he would need a screen saver? After Dark, if you have a braille version, please call!

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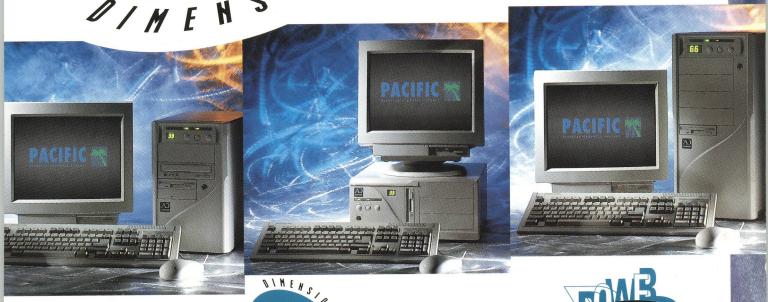
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